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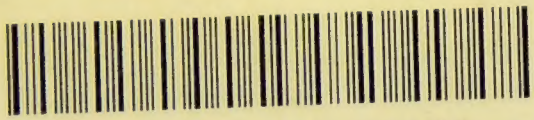
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THE PREVENTION OF DISEASE


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THE PREVENTION OF DISEASE

TRANSLATED FROM THE GERMAN

WITH AN INTRODUCTION BY

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Preface to the English Translation.

It has been the endeavour of those concerned in the translation of this work to render the meaning of the original into readable English. To effect this it has in many places been found necessary to break up into convenient portions the lengthy sentences which are so frequently met with in German scientific literature, but which are alien to English; and so far as possible the presentment of German idioms in English words has been avoided. Great attention has been paid to rendering the scientific terms and expressions by their correct English equivalents.

Here and there slight omissions have been made, nearly always for the purpose of abbreviation or condensation. It has not however been deemed advisable to modify any of the statements of the original, although there must necessarily be numerous points on which there is room for two opinions.

WILMOTT EVANS.

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Introduction

When Messrs. Archibald Constable & Co. told me of their intention to publish the German treatise on individual prophylaxis, of which this volume is a translation, and invited me to introduce it to the profession of this country, I had much pleasure, on ascertaining the scope of the work, in complying with their request.

There are many who will, I think, agree that the term "Preventive Medicine" is employed in this country in too restricted a sense; that its application to preventive action in relation to certain infectious diseases alone is practically a misuse of the expression.

For although Preventive Medicine might reasonably be thought of as dealing with infectious diseases generally, it must be accepted that its efforts have been in the past, and are still, mainly directed to a few only of such diseases.

When indeed we have made mention of smallpox, of scarlet, typhus, and enteric fevers, of diphtheria, and of certain exotic diseases, such as plague, cholera, and yellow fever, we have gone far to exhaust the group of maladies with which Preventive Medicine is wont, as a matter of actual practice, to directly concern itself.

Although professedly, and in a small degree in practice, diseases such as measles, chicken-pox, erysipelas, puerperal fever, and infantile diarrhœa are regarded as within the sphere of influence of Preventive Medicine, it cannot be said that hitherto any very comprehensive attempts have been made to curtail their operations; and it is only quite recently that pulmonary tuberculosis, which has now for

many years been regarded as communicable, has been added to the diseases concerning which many of our sanitary authorities are now taking action.

With respect to certain other diseases, such as syphilis, the communicability of which has long since been established, which are responsible for much impaired health, organic disease, and premature death, and one of which maladies is but too easily transmitted from parent to offspring, Preventive Medicine in Great Britain is at present silent. Possibly it is well, seeing the ethical and controversial problems involved, that this passive attitude towards the diseases here in question should not be suddenly disturbed. The State cannot, perhaps, move in a matter such as this, except in response to a decisively expressed public opinion; and to overload the machinery of public health administration with unpopular measures is, as has been amply exemplified in the history of public health, a futile and eminently unscientific proceeding. In a word, State Medicine is as yet in its infancy, and the near future has, in my opinion, enormous developments in store. But pending any collective action by the State, there is the more need and greater scope for the exercise of prophylaxis on the part of the family physician; indeed, whatever attitude the State may in the immediate or remote future adopt, there will, it seems to me, be a growing demand for the services, in a prophylactic sense, of the medical practitioner; and it is to the general medical practitioner that this work is mainly addressed.

It has, of course, to be borne in mind that Preventive Medicine, in its direct efforts to control the spread and to promote the extinction of certain communicable diseases, has exerted, and is exerting, an altogether remarkable effect upon the health of the individual and of the community; that the eminently successful efforts of public hygiene to provide a pure and plentiful supply of water; adequate air-space and light in and about dwellings; safe and inoffensive removal of sewage and refuse, and a better control of our foods and drinks, is producing an effect which is felt quite outside a limited group of infectious diseases.

Moreover, the modern tenour of factory and workshop legislation, as also of measures, such as the Infants' Life Protection Act, indicates that the State is beginning to accept responsibilities, *quâ* the health of the individual, over and above those which are embraced in the prevention of infectious disease and of accidents.

Still, when all this has been conceded, it will probably be accepted that the Legislature as such, and the sanitary authorities upon whom devolve the detailed application of the Public Health Acts, have not hitherto directly concerned themselves with the rearing of a healthy citizen, save in so far as they have endeavoured to prevent his illness from certain infectious diseases, and, in so doing, have materially promoted his physical welfare.

Nor can it be said that outside the State there has been any very serious or concerted attempt towards founding a science of individual prophylaxis; an omission for which the public rather than the profession is responsible.

The medical adviser is called in to divert complications and death where disease has already appeared; he is but rarely consulted as to the manner in which disease itself may be prevented from crossing the threshold. Whether or not it is true, as alleged, that the Chinaman pays his physician only so long as he remains well, such a custom does not obtain in Europe. And yet how many are there who, having reached middle life, cannot appreciate how much better their physical condition, and hence their power for physical and mental endurance, might have been, had they been looked to in a prophylactic sense in their childhood and adolescence?

Now the work which Messrs. Archibald Constable & Co. are herewith publishing aims, in a measure, at supplying this omission. Its object is the development of individual prophylaxis. It is, as far as I am aware, the first attempt which has been made to view human disease in its entirety, whether communicable or not, from the standpoint of Preventive Medicine, in the more comprehensive sense of the term.

As with an architectural structure, so also with human

diseases, we obtain different and fresh impressions, albeit the structure is seen over and over again, according to the aspect from which we approach it; and the sum total of the multiple impressions thus received makes us more familiar with the edifice as a whole.

The human economy has been repeatedly approached, with the result of an ever increasing knowledge, from the medical, surgical, pathological, and psychological aspects, but it has not, save in an altogether too restricted sense, been approached from the view-point of the prevention of deterioration and disease.

Professor Martins, who contributes to this volume an admirable chapter on General Prophylaxis, attempts to differentiate between Hygiene or Public Health and Personal or Individual Prophylaxis. He even sees antagonism of principle between these two when he says, "Indeed it cannot be denied that here there is a great gulf, a dreadful contradiction, between the aims of the hygiene of the individual and the hygiene of the race. By hygiene as applied to an individual the physician strives to improve the life even of the most wretched human being, and his efforts are the greater the more feeble is the individual; but the hygiene of the race has for its ultimate aim pitilessly to eliminate those of weakly constitution, and thus improve the whole people."

But here Professor Martins is voicing a broader and more evolutionary conception of Preventive Medicine than is understood by the term in this country.

I have elsewhere[1] stated that "the aim of Public Health or Preventive Medicine is to curtail and, if possible, prevent disease, to prolong existence and to render life happier by means of improved physical conditions," and I fear that even in this definition I may have gone further than some of my colleagues in the Public Health Service would care to go.

But Preventive Medicine, properly understood and applied, far from being the prerogative of a special branch of

[1] Quain's *Dictionary of Medicine*. Third Edition, 1902, edited by H. Montague Murray, M.D., F.R.C.P. Longmans, Green & Co.

the profession, must, it seems to me, guide our action in every branch, and perhaps be made use of by no one more than by the medical practitioner or family physician. He is in an exceptionally advantageous position to recognise the earliest opportunity for the application of prophylactic measures, either by himself or, through him, by those who have devoted special attention to one or another organ or system.

Preventive Medicine, as above set forth, strives to promote the quality as well as the quantity of human existence. Its highest function is not merely to prolong the expectation of life, but to enhance the sense of well-being during life.

We have not here in England concerned ourselves very seriously with what is likely to be the effect, in an evolutionary sense, of Preventive Medicine upon the future of the race.

Whether or not the perpetuation, and consequent opportunity for propagation of the physically unfit is a wise measure from an evolutionary standpoint is a question which hardly calls for isolated consideration. Such perpetuation is inextricably bound up with the improvement alike of the relatively fit and of the unfit; in a word, with a general physical improvement of those now inhabiting the planet.

Nature alone can determine, and that only in a post-dated fashion, who are the fit and who the unfit.

Moreover, since physical evolution would appear, as far as our knowledge of it goes, to be bound up, or to be at the present time progressing along with, a moral evolution which attaches more and more importance to human life and well-being; since, too, in the course of selective action based solely upon physical qualities, man might by active interference have kept back from existence some at least of those who have enunciated and elaborated this very evolutionary thesis, we may perhaps leave these remoter issues to natural selection, and limit our horizon to the present and immediate future.

We may do this with the more equanimity since this

moral evolution of which mention has been made would seem to be tending at present to discourage marriage unions between those having undesirable physical or mental tendencies, such as might, through marriage, become accentuated in the offspring.

In this country, however, we have not considered, even ideally, other than the generations living or immediately to follow, and there would seem therefore to be no antagonism in principle between what we term Preventive Medicine and what is spoken of, in this volume, as individual prophylaxis. Each is an accessory to the other, or, rather, the latter is a branch of the former; and the operation of both must inevitably promote the growth of the science of Preventive Medicine and enlarge its sphere of general utility.

This individual medical prophylaxis is, again to quote Professor Martins, "The sum total of medical counsel and rules intended to protect the individual against disease. In this sense medical prophylaxis guides the individual through the entire course of life, from the cradle to the grave."

It is one of the functions of this branch of medicine to ascertain as early as may be in the existence of the individual, and with the aid which the life history of his immediate progenitors can afford, what is the predisposition of that individual towards any given "pathological reaction"; and, having ascertained such tendency, to prevent its operation. Disease is not, as we are reminded by one of the contributors to this volume, a "thing," but the resultant of many factors, the working together of which alone constitutes disease; and one of the best uses to which the public can put medical science is to seek its aid towards preventing the co-operation of the several factors involved.

Dr. Rosen simply and aptly illustrates the goal of individual prophylaxis when he remarks, "The physician ought not to wait until he discovers an impaired note at the apex of the lung, or hears râles, or till the discovery of tubercle bacilli with the microscope makes the suspected diagnosis of tuberculosis a certainty, before he begins to

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treat the patient hygienically and dietetically"; and Professor Martins expresses the same idea in saying that "To bring up a weakly child who may be hereditarily tainted, so that it does not succumb to the threatening danger of tuberculous infection is individual medical prophylaxis."

So, too, Professor Mendelsohn, of Berlin, who contributes to this treatise the section on the prevention of diseases of the heart, will appeal to his readers when he insists that "a truly scientific prophylaxis of heart disease can only be carried out by the physician who makes a functional diagnosis, not an anatomical one. It is not enough merely to auscultate and percuss, and when nothing abnormal has been detected by this procedure to conclude that special prophylactic measures are unnecessary. Even when there is no such organic abnormality present in the heart, its condition and functional capacity should be determined in every possible position of the body—when sitting, when standing, when lying at rest and after different degrees of bodily exertion."

This endeavour to found a science of general prophylaxis may be regarded as an expression of the claim of the individual to be studied, and treated, with a due consideration for his tendencies, bents, or "idiosyncrasies," whether these are due to hereditary transmission or not. He asks that he may not, without due inquiry, be forced into the "average" mould in the matter of drugs, education, or employment; that the "personal equation" may be made a note of as early in life as possible, and that his anatomical and functional capacity may be had regard to in the consideration of any questions likely to involve his health or well-being. Clearly, considerations of treatment cannot be altogether separated from those of prevention. All treatment is in a certain sense preventive in action, whether its aim be to avert complications, further deterioration, or actual death; and what may be termed prophylactic therapeutics will be found duly treated of in the present work. Although, as Dr. Windscheid has it, "against old age there is no prophylaxis," we can, by well-regulated preventive action postpone the death which seems the inevitable penalty of birth.

It is impracticable in an introduction such as this to convey an adequate idea of the precise scope of the present work, which extends over nearly 1,000 pages, and a brief indication of the ground it covers can alone be attempted. The volume opens with a section by Dr. Goldschmidt, dealing with the principles of the prevention of disease, and furnishing a short, and highly instructive, survey of the prophylactic methods in vogue among the Hindus and Chinese, the Israelites, Egyptians, Assyrians, and others. This is followed by a historical sketch of the growth of general preventive measures, such as the provision of public water supplies, refuse disposal, etc.; and under this section there is an interesting account of the gradual development of the prophylactic idea in respect of the control and examination of meat, more particularly in Germany. It will be well that some of our lethargic local sanitary authorities shall learn that in Augsburg, as early as 1276, the slaughter of cattle was prohibited except in slaughter houses, and that in 1716, in Hanover, it was ordained that all cattle should be examined while still alive, and that, if healthy, a mark should be branded upon their horns.

After a historical account of the prevention of Epidemic Diseases, we come to what has to be regarded as the special feature of the work, which is prefaced by the highly interesting article on "General Prophylaxis," by Professor Martins, to which we have already referred.

Thereafter the several contributors treat systematically of the separate organs, systems, or tissues of the body.

Throughout each section there is brought home to the reader the scope which exists for preventive operations, and he seems to realize the very contracted character of our present day conceptions and practices in respect of preventive action.

Whether he reads the section on prophylaxis in surgery, in midwifery, in the diseases of children, in those of the eye, ear or teeth, or whether he surveys the field of prophylaxis in diseases of the generative and urinary organs, the results are the same. The need for greater and more

continuous medical supervision, a supervision which can, at any rate in the first instance, be most usefully exercised by the family physician, is unconsciously brought home to him; and the conclusion at which he arrives is that the development of this prophylactic idea is calculated to promote the progress of public health and lead to a better recognition by the public of medical advice and guidance. If, indeed, advances were made even in the single direction of appointing medical officers to schools who should periodically test the special senses of the school children, look to their teeth, test their sight and hearing, detect existing or threatening deformities, and reduce the hours of work of the physically and mentally unfit, the harvest would speedily be so abundant that further action in a similar direction would naturally follow.

Obviously, in a work such as this, which is compiled by many writers, there are some divergencies of opinion, more particularly in relation to those diseases for which the world is still striving for a prophylactic. There must necessarily be views expressed with all of which no one writer can be expected to entirely agree, and upon which no one writer is capable of expressing an opinion. The work possesses an additional interest in that it was written in the first instance for the profession in Germany. But the by no means easy task of converting German into readable English has been successfully accomplished, and the method of treatment throughout is original and exhaustive; indeed, a perusal of it leaves the reader with a clearer conception of the multitudinous bearings of diseased conditions, and furnishes him with suggestions which, in application, should be fraught with the saving of many lives and the prevention of much disease and discomfort.

In conclusion, I venture to think that this new departure will be cordially welcomed by the profession; and the book may, I trust, be instrumental in laying the foundation of a systematic individual prophylaxis in this country. With the rapid growth and diffusion of knowledge as to the prevention of disease, the physician will be asked in an ever increasing degree how the onset of certain pathological con-

ditions may be prevented; and although he may not, at present, always be in a position to indicate the lines which should be followed, there can, I think, be little doubt that the subject of individual prophylaxis will occupy an important place in medicine in the near future.

H. TIMBRELL BULSTRODE.

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MEDICAL SOCIETY

The History of the Prevention of Disease

BY

DR. S. GOLDSCHMIDT

OF BAD REICHENHALL

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The History of the Prevention of Disease

In tracing the history of the prevention of disease, we find that the measures adopted for this purpose have always followed certain lines, which often run parallel one with another, though various races at different times have given greater prominence to some one of these than to the rest. With primitive man without any form of government the prevention of disease differed but little from that which we see among animals. He sought probably to protect himself against changes of weather, against meteorological events, against hunger, and against the attacks of wild animals. Among nomadic tribes at the present day prophylaxis takes the form of contests of strength, warlike performances and gymnastic exercises. But they have also their regulations with respect to food, cleanliness, and magic rites which rest upon the ancient idea of the demonological origin of disease. Among all these peoples we find certain definite customs in connexion with family events, such as marriage, the birth of a child and death. The wearing of amulets and other magic charms has also originated from the desire to guard against disease and danger.

We shall see that highly civilized peoples, clinging to the conception of a demonological or theological causation of disease and of danger, seek to protect themselves against these just as uncivilized races do, because at all times and among all races there exists in addition to the scientific view of the true cause of disease, also the opinion that disease may be traced to supernatural causes. Religious rites

which have been handed down and are still practised among us today have not a symbolical meaning only. In the opinion of the people, religious ceremonies are concrete means for the prevention or for the cure of disease. If we look at one of the oldest of civilized peoples, the Hindus, we shall find the conception of the demonological causation of disease so greatly developed and so conspicuously permeating the whole life of this unequally gifted but most interesting people, that the history of prophylaxis would be incomplete without mention of their customs.

The strengthening of the body and cleanliness, to which even nomadic tribes give some attention, are found to be considered of even greater importance by races who have settled down in any locality. The Greeks and Romans practised gymnastics regularly. Among the Greeks these found their highest expression in the Olympian games, and gymnastic exercises were resorted to not only for the strengthening of the body for war but also probably for its aesthetic development. For not only do we find the men exercising their bodies in order to be able effectively to resist an enemy, but the women also developed their muscles by gymnastics though with no idea of taking up arms against an enemy. The bathing and anointing of the skin and washing of the feet after journeys were customs among all ancient races. The Egyptians regarded cleanliness in the light of a divine commandment. The ruins which can still today be seen of magnificent baths for the Greeks and Romans testify to lavish expenditure, both municipal and private, for making bodily cleanliness possible for all the citizens. Amongst the Hindus, Hebrews and Mohammedans religion requires frequent ablutions and baths. It is clear that all these hygienic rules as well as the command to put on new garments on certain occasions have also a symbolical meaning. Among those nations whose religious customs are closely allied with hygienic and dietetic regulations, it is difficult to determine which was the primary motive. On the other hand, as a contrast to these hygienic regulations, we find numerous religious ordinances which are quite opposed to

the principles of health. Such for example are the rules about penance, fasting and mortifying the body: in a word the absurd regulations of asceticism, which sprang up upon the fertile soil of the East as a means for preventing to some extent a too joyous conception of life. Unfortunately these ascetic practices have crept into the civilization of the West as the results of atavism.

Among all races it was customary to anoint the body after the bath. The anointing was often associated with a kneading of the body which had a beneficial and tonic effect, and which has recently been revived as a therapeutic agent under the name of "massage."

Further evidence of prophylactic regulations is to be seen in the provision made for the water supply of many ancient towns. Remains of aqueducts and conduits have been found in Egypt, Assyria, Greece and Rome, the latter in such a good state of preservation that it has recently been possible to make use of them again. The knowledge that many diseases may be caused by drinking impure water seems therefore to date back very far. Hippocrates, the father of medicine, urgently recommends physicians to test drinking water carefully, and expressly warns them against water from marshes as especially dangerous to health. It is obvious therefore that the ancients were not indifferent about the water for drinking purposes, and their regulations about diet show an even more strenuous endeavour to prevent disease which may be caused by food. Among the Egyptians and the Jews we find clear regulations about food, the supervision of which was entrusted to the priest; this will again be referred to in greater detail in a special section relating to the Israelites. The disposal of the excretions of the body and of other impurities also occupied the minds of ancient civilized nations. The Cloaca Maxima of Rome is the most impressive of these drainage works and can still be seen today in action. Remnants of food which would become a source of danger through decomposition were destroyed by burning, while the excreta of human beings and of animals generally were drained into the rivers. Rules for the disposal of the dead,

whether by cremation, as among the Hindus, Greeks and Romans, or by burial, as among the Israelites, show that the object was to remove from dwellings these sources of disease as quickly as possible.

Thirdly, there was the protection against epidemic diseases. No civilized people failed to recognize the difference between infectious diseases and the other groups of maladies. At different periods of history we find sometimes one infectious disease sometimes another most prevalent. Smallpox must have been known in very ancient times, because in all histories of medicine we find mention of inoculation against smallpox among the Hindus and Chinese several centuries before the introduction of inoculation into Europe. But both in antiquity and in the middle ages no disease attracted so much attention as bubonic plague which, known sometimes by that name, sometimes as the "Black Death," decimated the towns of the civilized world. Since the first thirty years of the nineteenth century plague has only reached the confines of civilized countries but has not penetrated within them. Asiatic cholera then appeared in history and its ravages were not less than those of plague. Besides such pestilences, which fortunately appear only sporadically, we find records of leprosy among the ancients as a contagious disease which spread far and wide at the time of the Crusades, in Germany, England, Italy and France, and as we shall see later gave rise to very valuable institutions. Towards the end of the middle ages, at about the beginning of the Reformation, syphilis seems to have been more prevalent than either before or since. We must consider historically each of these epidemics in turn and find out how the people tried to guard against them. Our plan will be first to consider the prophylactic measures adopted by the various great races of men. Then we shall take a retrospect of the various general preventive measures and of personal prophylaxis, and lastly trace out the historical development of the prevention of the different epidemic diseases.

PART I

PROPHYLAXIS AMONG THE HINDUS

We have already referred to their practice of inoculation against smallpox. There was also a sensible regulation which forbade any one going out in the rain unprotected. These and the rules about washing are however the only ones of any scientific medical interest which we find among the Hindus, all others are the outgrowth of fantastic demonology and superstition. Disease is not so much regarded as a punishment sent by God but as merely the work of unfriendly demons which must be counteracted by antidotes such as incantations, strange ceremonies and exorcism. Though this kind of prophylaxis can lay claim to no medical value, yet its historical significance is unmistakable, and even today among Europeans we find superstitious ideas about disease and its prevention which have come to us from the Hindus. In this sketch we shall make use of the descriptions given by Bühler in his very thorough work *Grundriss indo-arischer Philologie und Altertumskunde*, Strasburg, 1897. Unfortunately the medical part of this work is not yet completed, but the third volume contains sufficient material to serve our purpose.

The child begins to be cared for even before he is born, in fact during the very first month of intra-uterine life. By prayers and sacrifices the sex of the coming child is decided. For the fourth month a ceremony is prescribed to prevent miscarriage. The woman moistens her right hand and passes it across her abdomen above the navel three times while repeating certain phrases. This cere-

mony is followed by the garbharáksana, for the preservation of the embryo. A fruit (sthalipaka) is boiled, is offered as a sacrifice by her six times, and afterwards the mother's abdomen is anointed with butter while certain words are recited.

Preparation is made for delivery (josantihoma) by selecting a room in which it is to take place. This is then anointed or fumigated as a defence against evil spirits (ráksas). As soon as labour pains set in three experienced women are called in. The father lights a fire, scatters it about, offers sacrifices on it, and then besprinkles the woman in labour with the consecrated elements. In other castes he pours water into a vessel which has not been used before and besprinkles the woman with it, he places a turymti plant at her feet and touches the head or body of the woman with it. The latter is moreover often stroked in a downward direction. Four blades of munja, with their points towards the east, and four reeds with their points towards the west are put upon her head and form a kind of oracle, since if they break down it forebodes danger to her life. The woman is washed with warm water from the right side of her head downwards over the whole body. To ensure a normal third stage of labour the mother is sprinkled with consecrated water after the birth of the child. If the child dies directly after birth certain special ceremonies are performed, but these are not of any interest in connexion with our subject.

To ensure a safe puerperium another fire is immediately lighted in the house after the delivery of the woman and is kept alight for twelve days. The newborn child is held over the fire while herbs are burnt in it for fumigation. All domestic work is carried out by the light from this hearth. Grains of mustard seed and of rice are used for this fumigation. Curses against demons are uttered several times a day before the fire. Every time after offering sacrifice the father washes his hands and recites a poem. Twelve days after delivery the fire is put out, mother and child are washed, dressed in new clothes, and both are permitted to leave the lying-in room.

We pass by the consecration ceremonies performed when the hair is cut, the ears pierced, the beard shaved, and the child goes to school—ceremonies intended to frustrate the malignity of impish spirits. The marriage ceremonies claim our attention. An important and sensible rule is, that the woman, although obliged to be of the same caste as the man, must not be related to him. Certain bodily marks debar from marriage, but little is known about the subject, and they seem to be decided by oracle rather than by any examination.

Before the Hindu builds a house he must thoroughly examine the site. The ground must not contain salt and must have upon it no plant which is thorny or contains milky fluid. Certain plants must be found only in certain aspects. Thus towards the east there must be no asvattha, as it brings danger of fire to the house; towards the south no paksa, because it brings illness and early death; towards the west no nyagradha, because it brings with it fighting; towards the north no udumbarha, because it brings disease of the eyes.

When illness arises the patient should dwell in the east, north, or north-west of the house and he will then recover.

We shall omit the complicated customs at death and merely mention that children who have died under two years of age are buried, but all other dead bodies are burnt. But previously they are exposed to view for a long time. Those who have taken part in a funeral procession must not enter their houses again till they have fulfilled the strict regulations for purification. But these are regulations which have to do with mourning rather than the prevention of disease. The house in which any one has died may not be re-entered for three to fourteen days, according to the nature of the fatal illness. To prevent hereditary disease the grave must be kept well watered.

As there are certain customs and ceremonies for the prevention of disease, so there are others again by means of which the disease may be transferred from one person to another.

This superstition survives in the "jettatore" and "malocchio" of Italians.

The regulations which we have described were not only in force in ancient India but are still largely practised even at the present day by this highly gifted but apathetic people who have found in Buddhism the most powerful expression of a melancholy conception of the world. It is not surprising that Hindus, holding these views about medicine and taking no active preventive measures, cannot rid themselves of the many diseases which starting thence often spread over the whole world, and are always endemic in India. As they do not even know how to guard against poisonous reptiles and beasts of prey, to whom about 40,000 human beings fall victim every year, so they do not try to protect themselves by rational methods against the still greater dangers of infective disease. The reports of travellers that the Indian jugglers know how to make themselves immune to the bites of poisonous snakes still require confirmation.

PROPHYLAXIS AMONG THE CHINESE[1]

The Chinese have no native religion, and no priesthood and no church except those which have been imported from other nations. Nevertheless it is only natural that superstitious beliefs about diseases, their treatment and prevention, should have crept into this nation with its enormous numbers of ignorant people. Yet prophylaxis among the Chinese is more of the nature of pedantic rules which have sprung from absurd conceptions of the universe rather than from demonology. The Chinese are thoroughly imbued with a sense of loyalty. They know nothing of the exclusive caste system of the Hindus, but they bow down before the idea of rank with its degrees, and see in their poor mythological conceptions the degrees of rank which are obvious to them in the State. Their deities are the sun, the moon, the stars, and other impressive pheno-

[1] The information here given has been taken from Path's work *Religion und Kultur der Chinesen*, Munich, 1862.

mena of the sky and the earth. There is a spirit of drought, a spirit which injures horses, a spirit which permits poisonous animals to exist, and they appease all these spirits by many kinds of sacrifices of little value. According to the severity of any disease it is referred to some higher or lower deity. Occasionally true Shamanism is met with. At each season of the year (and the Chinese have five seasons) there appears an inspector of the districts, fung-siung-shi, who drives away the diseases peculiar to that season; his function seems however to be exercised more in regard to the diseases of plants and of animals than those of men. He appears clad in the skins of young bears, has four eyes of yellow metal on his dress, carries a lance and shield, and is accompanied by 100 followers in red and black dresses. In the spring the exorcist (Wa) addresses the spirits to prevent epidemics. But the real prayer against disease is always said by women—praying women (niutscho). There is no real priesthood among the Chinese. Prophesying, for which the tortoise shell and the tsie plant are used as an oracle, is practised by certain men.

The market regulations introduced by Confucius form a collection of advice rather than of any real sanitary rules. They contain warnings against the produce of the field when not in season, against fruit which is not ripe, against birds, game, fish, which have not been killed according to direction. Further, raw food material alone must be offered for sale, but no prepared food or beverage. Lastly, they exclude from the market all animals and wine which have been offered in sacrifice.

A better understanding of hygiene is shown in their teaching that food must be according to the individual's age, and that an old man may take many foods which are forbidden to the young man. But this instruction is so arbitrary that it loses much of its value for prophylaxis. The Chinese are not given to taking alcohol. Cultivation of the vine was introduced late into China, and grapes are always eaten as fresh fruit. The Chinese make an intoxicating drink from rice. The injurious effects of alcohol

seem long ago to have been known and it is only permitted to be used upon special occasions. But in order that drinking might be reduced to the most moderate quantities, the ancient emperors ordered this beverage to be drunk only from very small glasses, and that 100 obeisances should be made before drinking another such portion. Thus a small quantity of alcohol takes a long time to consume. The following regulations about food are for the most part completely incomprehensible. It is forbidden to eat young fowls and turtle, wolves from which the intestines are missing, dogs without their kidneys, foxes with the backbone missing or without a head; rabbits and hares which have been deprived of the lower portion of the backbone; sucking pigs in which the brain is missing; fish without bones; turtles which have lost one shell.

The skin and sinews of slaughtered animals are to be thrown away. Fish should be inspected to see whether it is fresh or tainted. Dates must be fresh, chestnuts without maggots. The down on peaches should be rubbed off; pears and apples should be bored when offered for sale.

These market regulations are some of them sensible, others absurd. Still more strange are the following warnings:—Oxen which low at night have stinking flesh; sheep with thin long wool smell rank; dogs with red thighs have rancid fat; birds with fine voice and shimmering (white) feathers have putrid flesh; pigs which do not see well and whose eyelids stick together have fatty tumours; horses with black back and fore-legs have stinking flesh. The following preventive regulations sound a little more sensible. The tail of chickens when narrow and full should not be eaten, nor the flesh near the tail of the wild goose. The meat on the ribs of swans and owls is not safe, neither is the liver of the fowl nor the stomach of the wild goose and stag. Meat to be eaten should be tender. From this list of food we see that the Chinese in general are not particular in their diet. If we add to this that the modern Chinese despise neither rats nor moles nor snakes as food, the above laws may seem absurd but are nevertheless intended to restrict him in his appetite.

The mode of thought of the Chinese in reference to spiritual matters affects their laws about food, different kinds of which are special to certain seasons. The Chinese recognize five elements (wood, fire, earth, metal and water), and with these they associate five fundamental colours and also five varieties of food, one for each season. Further, they distinguish between five different kinds of taste; and the element, the season, the colour and the taste must always agree. In the spring, which corresponds with the element wood and with the colour green, bitters should be eaten. In the summer, the season of fire and of red, sweet foods are eaten. The season between summer and autumn corresponds with earth and the colour yellow, and things pungent should be eaten. Autumn is the time for the colour white and for metals, therefore acid things should be eaten. Winter is the season of water and of black, and then salt food should be eaten.

We must not omit the hygienic regulations about dwellings and cleanliness, though here too there are no obvious intelligible reasons for them.

The doors of the house should always be open. The head should lie towards the east. If an inmate becomes ill or is overtaken by a storm he should change his position. He gets up even if it be night, dresses and puts on his hat. The body must be washed five times a day, each part of the body with a different water; the head and face should be washed with millet water. After a bath, different dry towels are to be used for the upper and for the lower parts of the body. Moreover after a bath the Chinese have to lie upon a mat on the grass and drink water. Every fifth day children are admonished to take warm water to their parents and ask to be bathed, and every third day to have the head washed. If the face is very dirty rice water may be used, but for soiled feet hot water only should be used.

It is curious that the Chinese who do not, like the inhabitants of India, burn corpses but cover them with a little earth and then erect a mound over them, do not have any common burial-ground. Each chooses for his

relatives some favourite spot outside the town, and on festival days all the members of the family go to the mound to deck it with flowers and possibly pray to the deceased. It is characteristic that the Chinaman according to his rank addresses a special deity, and it would be a punishable offence against etiquette if an ordinary citizen were to address his prayers to the highest deities, the sun and moon; the ruler however must address these deities alone.

From the above it is evident that this very intelligent but unimaginative people have not contributed to the advancement of prophylaxis and of medicine any more than have the inhabitants of India. And thus, though China is less exposed to the ravages of epidemics than the neighbouring people, yet it stands powerless against certain results which follow from its culture, and knows no method to adopt against its increasing over-population except infanticide, artificial abortion and extensive emigration.

PROPHYLAXIS AMONG THE ISRAELITES

The statement frequently made that the Jews are a "priestly people" means distinctly that some of the laws which were intended only for the priesthood in Egypt, were proclaimed as valid for all the people by Moses, the pupil of Egyptian priests. It is remarkable how severely any breach of hygienic regulations is dealt with. The severity which threatens with death the breaking of what often appears to us some trivial dietetic regulation will only become intelligible if we look at the historical events of the period when these laws were promulgated.

The Jews were a rustic people and very few in numbers. Moreover this small nation had not only to till a very unfruitful soil but also to be prepared for constant struggles with neighbouring tribes. Under these circumstances the preservation of each individual life was of the utmost economic importance. It was urgently necessary to keep up the working capacity of every man; whoever therefore did anything which would injure his own health would be committing a crime against the general welfare, against

the power of defence and the power of work of the whole nation. This affords a striking contrast to the inhabitants of India and the Chinese, among whom over-population had given rise to carelessness in regard to prophylaxis. To break the rules of health was not regarded from the standpoint of demonology but was looked upon as falling away from God, as a sin the direct consequence of which was punishment by God. The theological conception seems somewhat strange to our modern ideas, but compared with the demonological conceptions of the inhabitants of India and of the Chinese it marks a very great advance. The Bible recognizes no demons, and we find in it no suggestion of the belief in a devil. Man himself is responsible for his deeds, and though the hard law "Thy sins shall be visited unto the third and fourth generations" does not conform to our sense of justice, nevertheless it expresses what careful observation at all events shows to hold good for medical sins. The fact that the Jewish race still exists, though no longer a nation, though their national life lasted scarcely 500 years, and though they have been persecuted and hated by the nations among whom they have been scattered, is owing in no small degree to the scrupulous way in which they have carried out the biblical laws of hygiene. The best known of these hygienic laws refer to their food. Here too correct observation is mixed up with superstitious ideas, though the latter have in course of time assumed a commonsense meaning. The law that the blood of slaughtered animals shall be drained away rests upon the superstitious idea that life has its origin in the blood, or that the spirit dwells in the blood. Thence has arisen the dislike which the orthodox Jew even at the present day feels to the blood of animals. No part of the body may be used for food till all the blood has been removed by salt and water. Yet in spite of the superstitious origin of the custom, it is nevertheless a valuable preventive regulation in hot countries. Salt is very good for the preservation of the meat, and meat deprived of its blood is far less apt to decompose than meat which still contains blood. The law that the flesh of a slaughtered animal should be eaten not later than the third

day, and if not eaten then must be burnt, seems a very sensible regulation in countries where putrefaction sets in extremely rapidly. The Mosaic law forbids the eating of the flesh of certain animals as being unclean. We have seen that other races too have prejudices against eating certain animals. These national idiosyncrasies are not always intelligible. Yet it is striking that there is no race which does not exclude certain animals from use as food, while these same animals are eaten by other nations. There are American nomadic tribes who eat no fish; others again who have a prejudice against game. Even the Chinese, who eat such a variety of food, have, as we have seen, laws forbidding the use of some foods. Certain Indian castes touch no animal food, living exclusively upon a vegetarian diet.

The Mosaic Law especially forbids the eating of those animals which experience has taught may cause disease: such as the flesh of swine, of cats, and of certain rodents, which Luther translates "rabbits," but which probably are "rats." Recent research has shown that these animals are apt to harbour trichinae, and Virchow justly pronounces Moses one of the greatest of physicians of all time. Animals leading a free life such as wild animals and beasts of prey may not be used for food, partly to discourage the love of hunting which the Bible regards as a cruel sport, partly because it is not possible to control the food of such animals, and they sometimes eat food which is bad and which might be harmful to men. Humane feelings for animals is a reason why certain animals' flesh is forbidden to be eaten. Thus only can we understand why it is forbidden to eat the flesh of horses, asses, mules and camels, which have been fed by man. These animals are so useful to man that to use them for food is opposed to the tender feelings of the biblical lawgiver. But we should be going very wide of the mark if we thought there was a reason, sanitary or humane, for every such law. For example it is quite incomprehensible why the loins should not be fit for food till the iliac vein has been removed. The biblical writer has made a law of that which was a tradition long before the Mosaic period.

Ritual circumcision is a very vexed question. This custom was observed by many ancient races, and it is known that Mohammedans practised the rite long before the time of Mohammed. Recent historical investigation shows that it arose out of a heathen worship, the worship of Moloch. Still I believe we ought not to underrate the sanitary value of this operation. The removal of the prepuce prevents the collection of dirt, and the uncovered glans loses much of its vulnerability in course of time. But systematic data to prove the value of the rite are hitherto wanting. Moreover the raising of this operation into a religious act was certainly not of Mosaic origin. It is much more probable that Moses, who was opposed to all such heathen barbarous customs, had nothing to do with introducing this rite. He did not submit his own son to circumcision; but the boy was circumcised, without the father's knowledge, by the mother when the boy was ill in the desert. And the mother was the daughter of the heathen priest Jethro. Besides these hygienic laws stated above, the biblical lawgiver issued other regulations which cannot be improved upon even at the present day. He gives orders about the position of privies: these are to be outside the encampment, and the refuse is to be covered with earth. Most exemplary regulations are laid down about the life and intercourse between husband and wife, and about rest on the Sabbath.

For leprosy modern prophylaxis can add nothing to the biblical regulations. A leper must live outside the camp and must not frequent public places. If any one is suspected of having leprosy, he is isolated for seven days from the members of the community, and then must appear before the priest who examines him. If no suspicious signs have developed, the patient is to be kept another seven days outside the camp. When then seen for the third time by the priest, and there are no signs, the man is allowed to rejoin the community, but his clothes are burned outside the camp.

Space forbids us to say more; neither is it necessary, because the hygiene of food and the prophylaxis in the

Bible have already been described at length by many writers (Baginsky, Rabinowicz).

Later the Talmud concerned itself with preventive regulations for the Jews. In this we find sensible and foolish laws blended together. The rules about slaughtering animals must be pronounced excellent from the hygienic point of view, and we shall give the most important of them. For this unavoidable and cruel act the slaughterman must take care to use a very sharp knife without any notches in it, and should kill the animal with one cut, and this cut should pass through the neck as far as the vertebral column. This fulfils too the hygienic requisite of letting the blood flow out quickly, because this cut will sever the largest vessels which convey blood to and from the head. The subsequent washing with salt and water is also thereby made easier. After the animal is killed it must be inspected. And then the signs of disease are described so well that this description of the signs must have had a wonderful result at a time when there was practically no veterinary knowledge. For example we select the rule which states that animals in which the pleura is found to be adherent are unfit for food. Modern veterinary knowledge has shown that pleuritic adhesions are an important sign of pulmonary disease in animals. There are rules about the inspection of the spleen and intestines. And here again many valuable signs of disease in animals are mentioned. Side by side with these important and sensible laws there are absurd rules which can only be due to caprice: for example the law forbidding milk and meat to be eaten together, and this has been further elaborated by certain rabbis who do not permit milk, butter, or cheese to be eaten after meat until four hours have elapsed.

Modern science has adopted many of these sensible prophylactic measures. The regular inspection of animals by experienced men has added to the list several other signs of disease, and on the other hand has enabled us to remove certain injurious conditions. On the whole the endeavour in the Talmud to lay down the natural principles

of health demands the greatest admiration of scientific men.

PROPHYLAXIS AMONG THE EGYPTIANS, ASSYRIANS AND OTHER ANCIENT RACES

We know little about the prevention of disease among these races. They probably had baths and anointed the body, and observed certain rules about foods. It is known that the Egyptians endeavoured to exclude epidemic disease by quarantine, but the data available are so meagre as to be of little use for our purpose. The nations of classical antiquity, the Greeks and Romans, have also done little in prophylaxis. These two nations will be remembered for their arrangements for the supply of water, for drainage and for baths. I will merely give a few historical facts which show a partial and temporary attempt at prophylaxis.

It is known that Lycurgus ordered simple food for his Spartans, and his rules are regarded as correct when judged by the physiology and chemistry of today. The Spartan broth is celebrated. The laws of Lycurgus were intended to train up a strong warlike people, and the simplicity of the food was to accustom citizens even in times of peace to all kinds of hardships. Whether the custom of killing weakly children soon after birth was practised for any length of time is not recorded in history. Though cruel it appears at all events to be an invaluable prophylactic. In Athens we find a well organized market police supervised by certain special officials, the *ἀγορανομοι*. The flesh of unborn lambs was excluded from the market as being unfit for food. Pliny tells us that a severe pestilence which broke out among the soldiers of Alexander the Great on the march to India was caused by eating bad fish. In consequence of this, fish was prohibited as food for the soldiers.

In Rome from the year 388 aediles supervised the cattle markets, shops and eating houses. They determined the price of meat and its fitness for human consumption. Goat flesh was not forbidden, but was considered less valuable than other flesh. We can quickly pass over the classic

races, because we shall later have to refer in another part to the services they rendered in prophylaxis.

PART II

AN HISTORICAL SKETCH OF VARIOUS PROPHYLACTIC MEASURES

After the disruption of the Western Roman Empire the political relations of the civilized world were rearranged upon an entirely new basis. The Roman centralization was lost. Yet in spite of the division of the empire into separate territories, some large, some small, with different languages, we find Roman civilization influenced all of them. There is no reason therefore for us to follow the fate of these countries and races separately, since the development was much the same in all these territories, and they were united by a common culture and later by a common religion. We shall therefore discontinue the plan hitherto followed, and instead of tracing the progress of prophylaxis in each separate nation we shall now describe the various prophylactic measures, pointing out so far as possible the advances in prophylaxis made by the various nations. Repetition will be avoided wherever possible, though we shall have to refer again to pre-Roman arrangements to make the subject complete.

I. SUPPLY OF WATER

Not only for prophylactic reasons but also to satisfy an urgent natural craving, man has always been compelled to have a supply of water. When nature provided water which was disagreeable, man was compelled to find a source of water which was more to his taste; because, as Pettenkofer rightly points out, we drink water not only as a food but also for enjoyment. So in West Asia we find numerous wells and cisterns. In North Africa there are

wells three or four metres wide, not far from the Nile, which were used for drinking and for agricultural purposes, and are still worked today with waterwheels. These are in the opinion of some historians (Eyth) as ancient as the hieroglyphics. The Greek author Olympiodor wrote: "The oasis of Thebes is perforated by cisterns like a sieve." A number of these water reservoirs were put in order again in the sixth decade of the nineteenth century. In China too we meet with many round wells of very ancient date. Arrangements for supplying water were, as already mentioned, made use of by the Egyptians and the Romans. Some remains of aqueducts found in Egypt are of Roman origin, and similar ones are found also in Asia Minor.

In the sixth century B.C. Polycrates had built an aqueduct for Samos which consisted of a tunnel 1,000 metres long.

It was the constant care of the Roman emperors to supply the Eternal City with sufficient good water; for not only was much water required for the numerous inhabitants, but also because the baths and numerous fishponds of various rich Romans had to be supplied with water. Thus gradually magnificent waterworks were built, the oldest of which, the Appia Claudia, was opened in 313 B.C. A second large aqueduct, Anio vetus, was made in 273 B.C.; and more than a century later, 144 B.C. a third aqueduct, Aquamarva, was completed. Other aqueducts were subsequently built by succeeding emperors. Four of the old aqueducts are still worked (Aquavergini, Aquamarica, Aqua felice, Aqua Paolo).

In the provinces too of the old Roman empire there are numerous aqueducts: at Arles, Avignon, Arneuil, Constantinople, Lyons, Mayence, Nîmes, Paris, and Treves. Several of the provincial ones have in modern times been put in order and are again in use, as at Bologna, Metz, Segovia and Spoleto.

It is to be regretted that the long period which we term the middle ages allowed these splendid works to fall to ruins. In recent years attempts have been made in part to restore these and to supply towns with water of the best

quality in a way formerly undreamed of. What has been done in this matter during the latter third of the nineteenth century is so recent that it is unnecessary to give an account here.

II. BATHS

As in Rome we find waterworks, so also do we find baths. It sounds almost incredible when we are told that imperial Rome had 800 public baths. It is necessary to describe the arrangements in a Roman bath, and then we shall understand the very imposing ruins of these sanitary institutions (Baths of Caracalla).

Before bathing the Roman took a little exercise. The room in which he undressed was heated, and there after undressing he was anointed with oil. Then came the application of the strigil, and after this he went into a hot room or a hot bath to promote perspiration. Then followed a cold douche and a cold plunge. After these elaborate processes the body was again anointed. These baths formed to a certain extent a centre for the business and social life of the Romans. Here the events of the day were discussed, while some went through gymnastic exercises. The luxury of these baths seems not long to have survived the fall of the Roman empire. Not till the time of the Crusades do we see a revival of this institution in Europe. The Crusaders, returning from the East, tried to reintroduce the baths which were so common in the East. Only in Spain, where the Moors ruled for a long time, were luxurious baths established for the sake of the religious rites of Islam which required believers to bathe frequently. The manner of bathing was somewhat different from that practised at Rome. The bather, after undressing, wrapped round him a woollen cloak, put on sandals, and walked to the hot bath. After the bath he rubbed the hard parts of the skin, the heel and sole with pumice stone, and then came anointing and sprinkling with odorous essences.

When the Moors had been driven out of Spain one of the first acts of the pious populace was to raze to the ground these remnants of heathendom.

The baths which were established in Germany, France and England through the initiative of the Knights of the Cross soon met with great approval. It became a custom to take a bath before ceremonies such as marriage or knighting. So too on the eve of a festival every one went to his bath. Then the various reigning princes claimed the income from baths; they formed part of the so-called royal prerogatives. By transfer or by lease these were made over to the towns, and a special guild superintended and managed the baths. These were regarded in the light of curative agents, and it is evident that the founders of these institutions attached to them an hygienic value. It is worthy of note that every Saturday the artisans were called to their bath by a trained band of youths who carried drums. Vapour baths were introduced in the twelfth century.

Besides the public baths every rich citizen had a bath-room fitted up in his own house, a room which served also for entertaining his friends. Here the friends of the house assembled for feasts and banquets, but each guest first took a bath.

But in addition to these admirable baths the Knights of the Cross brought something less welcome with them from the East, namely leprosy, and many baths were doubtlessly established because of this terrible disease. At least it has been shown that so-called "soul-baths" were founded especially for the poor by benevolent persons both to prevent and to cure leprosy. It was a well meant but dangerous kind of benevolence, for it soon became evident that this method of trying to prevent leprosy was the very way in which to spread it. And so it could not but happen that many physicians became determined opponents of baths. Another circumstance too tended to discredit these baths. In the middle ages, that remarkable period which is characterized by religious fanaticism and indulgence in excesses, these baths were often used for the wildest orgies and shameless licentiousness. The clergy, physicians and statesmen then opposed these public bathing institutions and the good was thrown away with the bad, for owing to this opposition on

all sides and to the danger to health caused by these badly managed baths, most towns gave up their public baths.

It should be mentioned that at the commencement of the seventeenth century a number of cases of syphilis which occurred in Brünn were traced without any doubt to an infection at a bath. To understand this we must remember that it was the custom in many places to cup the bather directly after the bath, and the cupping instrument was not always carefully cleaned after each time of being used.

Instead of these public baths, which were being closed nearly everywhere in Germany, the custom arose of going to some bathing resort. Places which were pleasantly situated and especially which had water with curative properties were frequented in the summer by rich people. One of the oldest of these bathing resorts is Baden in Aargau, if we omit Aix-la-Chapelle which was much frequented even in the time of Charlemagne.

Vapour baths were introduced into France rather earlier than into Germany. They were called "étuves." As in Germany, a guild of bathers was established, called the "étuveurs." Cold baths and sea baths were first known in England, and this English custom was brought to Germany in the eighteenth century by physicians who had been to England (Hufeland and Halm). The cold water institutions on the continent date from the nineteenth century.

The value of the bath as a prophylactic and curative agent is thoroughly accepted. The perspiring which is produced by vapour baths has certainly helped to get rid of the toxins of certain diseases, and the use of cold water after a hot bath or to rub down the body fortifies the body and is valuable in enabling it to resist atmospheric influences as has been fully recognized in all ages.

III.—THE REMOVAL OF REFUSE AND THE DISPOSAL OF THE DEAD

Old historical records and ruins of buildings connected with the removal of refuse from towns are much more scanty than those connected with the supply of water.

Probably this refuse which would be injurious to health was removed in the simplest way and used to manure the land. But there appears certainly to have been the opinion that removal of the refuse by drains was only practicable with a simultaneous flushing.

The following are some of the facts as to drainage which have come down to us. Babylon, Carthage and Egypt are said to have had systems of drainage, and Jerusalem in the Herodian period is reputed to have such a system to carry away the waste water into special reservoirs. Here the impurities were allowed to settle to the bottom as in settling tanks, the water in the reservoir was then allowed to run off and the sediment was used as manure.

Up to the present day, as mentioned above, the Cloaca Maxima in Rome laid out by Tarquinius Priscus is still in use. It was built not so much for the purpose of removing refuse but to drain the town and marshy places. Later, all polluted water was also drained into it. It emptied itself into the Tiber below Rome. But even in Augustus' time it was noticed that the fluctuating stream caused a backward flow of the débris which led to serious results. The emperor in consequence of this ordered that the drains should be regularly flushed.

During the middle ages very little was done to keep the towns systematically clean. The oldest structure which exists in Germany for drainage of a town is that of the old pottery town of Bunzlau which was regularly flushed by means of a system of drainpipes as early as 1559. A similar arrangement was started in Prague in the seventeenth century. The oldest drains in modern Europe are in England. Almost every large town was provided with a system of drains, regularly flushed, and many date back to the sixteenth century. But even in England the polluted water was conveyed into the nearest stream. It is only since 1859 that attempts have been made to do away with this evil. London took the lead. By means of an intercepting sewer the sewage was conveyed to an outfall below London where it was allowed to escape only on the

ebbing tide into the Thames. But when this measure was also found inadequate, the sewage was previously submitted to a process of precipitation with the view of purifying the effluent.

Hamburg, following England's example, commenced to build drains in the fifties of the nineteenth century. Dantzig was the first town in Germany to have at the same time a drainage system, a water supply system and irrigation. Berlin, too, since 1875 has built a similar system which ranks amongst the greatest installations for drainage of the century. Almost all large communities nowadays have followed the excellent example of these towns.

The methods employed for the disposal of the dead do not show any very clear idea of prophylaxis. In Greece and heathen Rome the dead were burnt. The Israelites buried the dead in the earth at a depth prescribed by their laws. The European nations which sprang up out of the former Roman empire seem not to have had any strict regulations about burial till very much later. Not even coffins were in general use, and there were no regulations as to the depth of graves.

The churchyard was to only the slightest extent the property of the community, but rather belonged to the church authorities, and was always chosen so as to be near the church. Hence the name churchyard, which is still at the present day used to designate the place of burial. In South Germany, especially in Bavaria, the word Friedhof (cemetery) is general. But the expression Friedhof (place of peace) does not mean that those who rest there have found peace, but that the spot is separated and fenced around.

IV. RULES CONCERNING MEAT.

All historical records about this subject show that all settled peoples who did not themselves rear animals for food supplies, but were obliged to buy meat from markets, were protected by certain laws against fraud and against articles of inferior value. These laws have already been referred to so far as they concern the ancient races.

We shall now consider the regulations which were pro-

mulgated after the decline of the Western Roman Empire. These laws are mostly of municipal origin. Every community had its own police regulations about food. The government and the ecclesiastical authorities rarely interfered in the matter.

It requires mention that the German apostle Winfried Bonifacius forbade the use of horseflesh which was so much eaten in Germany, because he attributed to its use impurity of the blood and leprosy. But if we examine a little more closely into the reason of it we shall probably come to the conclusion that it was dictated by a religious rather than a sanitary motive, for it is well known that horseflesh was eaten by the old Germanians at their religious festivals at the solstice, so that the order struck at heathen ceremonies in which the horse was a symbol. This may also have been the reason why the eating of horseflesh was forbidden by the Council of Celeia in 787. On the other hand Pope Zacharias seems to have forbidden the eating of pork and of bacon from purely sanitary motives. In the time of Charlemagne the question was often discussed whether the flesh or blood of an animal which had died or had been killed by other animals might be eaten.

Towards the end of the eleventh and commencement of the twelfth century a guild of butchers was established in most towns of Germany. In free cities these were supervised by masters of the guild specially chosen for the work; in other towns sometimes by overseers, burgraves and other imperial officials. The oldest known charter which contains regulations about meat is probably that of the town Freiburg in Breisgau in the year 1120. These data have been taken from the very thorough treatise written by Ernst Gräber, to which all interested in the subject are referred. We reproduce here only a few selections from this book.

It is interesting to learn from an old deed of the town of Augsburg of the year 1276, that slaughtering was forbidden except in slaughter houses. Slaughter houses must have already been in existence therefore at this period. In many documents warnings are given against measly flesh, in

others against leprous flesh, mangy sheep and the flesh of calves which were too young. In many documents is a law ordering that inferior meat must be sold separately from good meat.

The conditions under the Holy Roman Empire were most unfavourable for the carrying out of sanitary measures. There is hardly any sign of any central initiative authority; not only did every sovereign make laws for his small territory, but every community in it had its own special laws. Only towards the end of the fifteenth century do we find an endeavour to supplant these separate powers by a strong central authority. Charles V, whose misfortune it was that he did not understand the age, and regarded the mightiest movements in human history as a mere revolt by unruly men and discontented priests, nevertheless endeavoured to strengthen the imperial power and to extend it. He was helped on the one hand by the natural decay of the feudal system, on the other hand by the new development of science which began to stir again during his reign after a pause of several centuries. The voices of physicians too began to be heard. And thus during the reign of this emperor an imperial sanitary police was established in the year 1530. They adopted special measures for beer, wine, bread and meat, and fixed the price of these. At the famous Imperial Diet held at Augsburg in the year 1548 these laws were brought again to the notice of all authorities with penal regulations.

Under this emperor experts upon hygienic and prophylactic questions were for the first time in Germany drawn from the ranks of the physicians. At that time too a few scientific works dealing with the preservation of health were written, as Von Strüppen's *Nützliche Reformation zu guter Gesundheit und Christliche Ordnung* and a German edition of Fortunus Fidelis (*Nissus sive medicinae patrocinium*, Panorma, 1698). In 1559 official inspection of slaughtered animals in Vienna was ordered by the State. In 1582 an order was issued by the government of the palatinate that all meat exposed for sale in the butchers' shops must be labelled. Measly meat was to be sold at a

special place, and flesh which was very measly was not to be sold at all.

The disgusting custom of blowing up meat was practised in earlier times even more than at the present day. Lichtenberg issued a rescript in 1587 which described this process as disgusting, deceptive and dangerous to health ("because many butchers have an unwholesome and disagreeable breath").

During that sanguinary time when a tedious war damaged the prosperity of Germany for centuries, it is scarcely possible to speak of an imperial authority. The power of the various princes which Charles V attempted in vain to suppress was a sovereign power equal to that of the emperor himself. The most powerful prince of that age, the Elector Friedrich Wilhelm of Prussia, in those stormy days raised the condition of his country with marvellous energy in spite of the dangers of war and its distresses. Prussia already possessed sanitary regulations, and these were consolidated by the edict of 1685, while for the regulation of medicine a central institution was established for Prussia, the "Collegium Medicum" consisting of physicians. After that uniform market regulations were drawn up for the whole country. In the year 1769 a second college was established, the "Collegium Sanitatis." The object of founding this second college was "under the Divine grace and care to protect our province and lands from the pestilential plague and other contagious diseases and to prevent the cattle from dying, so far as this is possible." Meantime a provincial medical college had been established in every province, and in 1786 the "Collegium Sanitatis" was instructed to combine with these and to take over "the supervision of all institutions against epidemic disease, pestilence among cattle and of all that concerns the maintenance of health and the removal of causes of disease among men and cattle." In 1799 these two colleges, "Collegium Sanitatis" and "Medicum," were united and were provided with more extensive duties. They were to occupy themselves with and examine into everything which might be injurious to health, to look out

for any abuses and to remove them by suitable sanitary rules and precautions; they were also to see that the food was wholesome.

In other countries too similar rules were made about this time: for example in 1712 in Hanover. In 1716 it was ordered in Hanover that all cattle should be examined while still alive. If considered healthy a mark was branded upon the horn of the animal. It was kept three days, then again examined, and allowed to be slaughtered if this second inspection showed the animal to be healthy. A few unconscientious dealers imported smoked and salted meat from abroad which came from diseased animals, and a law was consequently passed forbidding the importation of smoked and salted meat. In 1732 an order was issued in Hanover that calves which had been suckled by diseased kine should not be slaughtered till they had been taken away from the diseased mother and had been fed upon healthy milk for at least eight days. In the meantime they were to be carefully examined, and especially the tongue was to be examined for any ulcers. If not healthy such calves were to be slaughtered by an official, but not in the slaughter house, and were to be buried with their skin and hair at a depth of four ells.

Since 1803 regulations have existed in Prussia to prevent pestilence among cattle. But the greatest reform in this matter was the establishment of veterinary schools, the first of which was instituted in 1824 at Stuttgart. Unfortunately these measures to ensure the meat being sound were not carried out continuously. It is especially noticeable that the regulations about slaughter houses were gradually disregarded, so that in 1842 there was no longer any public slaughter house in Berlin, although a short time previously there had been three. It is remarkable that this condition of things was possible under the strict Prussian rule. Then Küchenmeister's epoch-making discovery about intestinal worms exposed the danger to the public of meat derived from private slaughter houses which were not under supervision. A still more lasting impression was produced by the great epidemics of trichiniasis which broke out in

Germany in 1864. As a result of this the Medical Society in Berlin appointed a committee to inquire into the subject of trichiniasis and the prevention of this dangerous disease, and the outcome of this inquiry was a unanimous recommendation by this learned society that supervised slaughter houses should be established in at any rate all the larger towns of the kingdom. The recommendation was not made in vain. And soon there was no large community in Germany which did not possess its slaughter house, or at least was preparing to have one.

The crown to this sanitary work is the establishment in our own day of the Imperial Board of Health. Still it should be mentioned that even before this imperial institute was founded various districts of Germany, such as Bavaria, Saxony and Würtemburg, had excellent regulations of their own about slaughtering and market police.

V. RULES FOR PERSONAL PROPHYLAXIS

In addition to these police regulations, to which the previous section has been devoted, there were also personal prophylactic measures which can be traced back some of them to old prejudices and customs, while others rested upon an apparently scientific basis, and others again upon the custom of taking certain foods and drugs which were renowned, sometimes rightly and sometimes wrongly, for their efficacy against disease.

1. Far into the period of the middle ages the mistletoe bough was regarded in Germany and in England as a preventive of disease and evil spirits. The custom arose out of German myths. Another plant which was used to protect against disease is the mandrake root. It is however difficult to conceive how the foolish belief in this root originated. Some authors maintained that it possessed a slight resemblance to the distorted face of one who had been hanged. It is certain that even in the sixteenth century the mandrake root was considered a most valuable remedy by the apothecaries of that day; that it was kept in special boxes called coffins, and only sold for very large sums. According to Kühn the custom is said to be con-

nected with fire worship in India and in Germany, and it is often put for the ash (the tree of Odin), the mistletoe, the hazel (magic wand) and the mullein. But if the Hebrew word "dudaïm" is correctly translated by "mandrake root," it was already in the Bible regarded as a means against sterility in women. It is mentioned as possessing this power in Genesis chap. xxx. verse 14. This would show that it was regarded as a prophylactic also by races which were not of Indo-European origin.

Pliny, in his *Natural History*, also records that the mandragora is valued as possessing many kinds of prophylactic and curative properties. Calomella translates the Greek name by semihominis, and perhaps to this name is owing the tradition that the plant grows only below the gallows of a man who has been hanged although he was innocent. Charlatans tell all sorts of marvellous stories about the danger incurred in getting the plant, and ask a correspondingly high price for it. Sixty thalers gold and even more have been paid for one mandrake. "They may only be gathered at full moon, and the plant is only efficacious when pulled up with its root. At the moment when it is thus pulled up, the plant utters such a terrible cry that he who hears the cry dies of fright. Therefore it has to be tied to the tail of a large strong black dog, and the dog is enticed by a piece of meat placed some little distance away. As the dog snaps at the meat the plant is torn out with its root, and the dog of course pays the penalty of losing his life."

A doll was carved out of the root in the form of a human being, was dressed in grand clothes, concealed in a valuable box called a "coffin" in some secret corner of the house; it was washed every month with wine and water and dressed in new garments. The possession of such a mandrake root protected against all kinds of dangers, removed sterility, made childbirth easier, lessened the labour pains, and guaranteed a good lying-in period. However in ancient times other plants were used for the same purpose, as aglaophotis and the peony.

Mistletoe is even up to the present time regarded as a

valuable prophylactic. Its fame rests upon the German myth of Baldur's death. Among the ancient Germans, a priest in a white garment had to cut it from the tree with a gold sickle and catch it in a white vessel. In Sweden it is still today regarded as a tree which protects against disease (especially epilepsy) and against burning. In England it is the tree of love. A drink prepared from it removes sterility, protects against every poison, and heals every disease. Epileptics should always carry a piece of mistletoe with them, because it prevents epileptic attacks. In Germany huntsmen prize it because it brings luck in hunting, and because any injury sustained while hunting will quickly heal.

The juice of the ash protects against the bites of venomous snakes. In Scotland the sap of the mountain ash is given to newborn infants instead of honey to protect them from cramp and diseases of the eye—"Infante nato obstetrix Scotiae montaneae viridis fraxini ramusculum igni immittit, succum inde imanentem ista deinde ori infundit infantis, ut primum ejus nutrimentum" (Finn Magnussen). In Germany chaplets of mistletoe and coral were valued as protective.

Lastly we must mention all those things which are renowned as prophylactics. Some of these are connected with the Christian religion, others are inherited, and others again are found by accident.

Baptismal water protects against cramp and inflammation of the eyes of children (East Friesland and Thüringen). Consecrated water, especially when hailstones have chanced to fall into it, protects men and animals against disease of all forms (Thüringen). A consecrated wafer will protect man and animal from cramps; so too will sacramental wine (Lauenburg). Whoever drinks this wine on the day of consecration will be protected the whole year against poison, witchcraft and lightning (Bavaria). Wax candles which are consecrated on Candlemas Day are fastened around the wrist of women in labour. This will give an easy delivery and a good lying-in period. The candle is most efficacious when Candlemas falls upon a Sunday.

A little metal scraped off a church bell and taken, is specially valuable in protecting cattle from all forms of illness, and it is also useful for man. The bellrope has a similar effect; and so too the fat with which the axle of the bell is greased. The buds on plants consecrated on Palm Sunday protect against swelling in the throat and fevers, especially in children. Candles, cloths, ribbons, aprons and pots which have been used for church ceremonies, have a great reputation as prophylactics. So too consecrated nosegays of nine different kinds of flowers; also the wedding ring, bridal dress and bridal wreath.

Among things inherited old Bibles rank high as protectives (especially the Apocalypse). Italians carried on a large trade in these at the commencement of last century. These were often placed in the infant's cradle to protect it from cramp. Old hymnbooks served the same purpose.

Among articles found the horse's hoof is famous even at the present day. Its prophylactic value is great against all infectious disease.

In all these things there was always some religious idea or some feeling of compassion; but another custom, which we can trace back into the distant past, was more brutal, and had to be performed by the blood of one who had been executed, though innocent. Indeed prophylactic value was ascribed to everything connected with an execution or murder or death.

As late as the year 1861 the foolish populace of Hanau rushed on to the scaffold on which a thief was executed for murder, in order to get a few drops of the blood while still warm; and in 1864 at Berlin the executioner after executing two thieves who had committed murder, dipped a quantity of linen into the blood which flowed out and quickly sold the linen for two thalers a piece. This blood protects against epilepsy and cures it. The nail to which was fastened the rope by which a man was put to death was made into gout-rings—that is, rings which protect against gout. The gladiators at Rome used to drink the blood of those who had been hanged, and so protected themselves from epilepsy; and bread which contained some of

this blood protected against gout. The bones and the cord with which the victim was hanged answered the same purpose.

In France at the present day the fat of criminals is asked for at druggists', as a protection against consumption. In the fifties a murderer in Switzerland confessed that he had slain an innocent victim, that he might have the blood and so protect himself against madness. Whether now and again some of the many inexplicable murders the motive for which is so difficult to discover (such as "Jack the Ripper") may not be connected with this superstitious belief is at least worthy of discussion. The old unfortunate superstition still exists among prostitutes, that they can be protected against the contagious diseases to which their dishonourable trade exposes them if they first have intercourse with an innocent youth.

2. Among methods which have come down to us from earliest antiquity, and to which still today great prophylactic value is ascribed, are blood letting, cures by purgation and cures by sweating. The three were very frequently combined.

In the foregoing pages it has been possible to separate the prophylactic measures from therapeutic ones, but this is not possible for the above mentioned practices. Probably the idea of these cures first suggested itself to the mind at the bedside; they were then used for patients, and later came to be used as preventives of the diseases in which they had proved efficacious. Venesection was probably the most unfortunate of these.

Pliny, in his *Natural History*, calls the hippopotamus the introducer of blood letting, and relates that when this animal feels plethoric it goes to the stubble in the field and opens a vessel of the thigh with the sharp points of the stubble. It then closes the wound with mud. This absurd story of Pliny's rests upon a correct observation that the sweat given off by the hippopotamus is bloodstained. Stephanus Byzantius, a writer of the fifth century, says that venesection was introduced by Pataleios, a son of Aesculapius. He is said to have been stranded upon a

distant island when a youth, and to have opened a blood vessel and so saved the life of a maiden who had become unconscious after a fall. The maiden, daughter of a shepherd on the island, was afterwards married by the successful physician. The operation later was much practised by the followers of Aesculapius in their temples.

In the Coan Prognostics it is taught that venesection should be performed for threatened haemorrhage in important organs. Hippocrates recommends venesection for febrile diseases, for pain in the breast when commencing, for difficult micturition, threatening apoplexy and loss of speech. This shows that he employed venesection not only in illness but also when a patient seemed likely to become ill.

Chrisippus of Cnidus, a Pythagorean, condemns venesection for mystic religious reasons (Galen, *de Venaesectione*), because the Pythagoreans, like the Israelites and several other ancient races, believed that the soul was located in the blood and venesection would lead to a reduction of the soul's function. His renowned pupil, Erasistratus, one of the founders of the Alexandrian school, is also no friend of venesection. As a substitute for it another Alexandrian Appollonius recommended cupping. The Empirics allowed a wider field for venesection. Yet a contemporary of Trajan, Menodatus of Nicomedia, would limit it to cases in which important organs are threatened with congestion. Asclepiades, who introduced Greek medicine into Rome and was also an empiric, recommends venesection for threatening apoplexy, but gives the warning that in other cases its use should depend upon the climate. In temperate climates it should be performed less often than in hot climates.

The Methodists ascribed to blood letting a depletive effect, and recommended it for plethoric constitutions. Galen, Oribasius and Aetius recommended venesection at the commencement of every inflammation.

Tralus was a great friend of venesection and, contrary to the opinion of his predecessors, he thought it did not matter which vein was opened. At that time the schools

taught that sometimes the vessel to be opened should be near the diseased organ, sometimes that it should be on the side opposite to that upon which the disease was.

The Arabians, especially Rhazes, were upon the whole in favour of venesection, but they too thought that climate should modify its use. Avicenna, the most famous Arabian physician, was much more careful than Rhazes in his enumeration of indications for venesection. He considered climate and season as valuable factors in deciding upon the operation, and he also took into consideration astrological data. In the sixteenth century, Brissot thought that venesection should be specially recommended as a preventive against epidemic diseases.

Batelli was an enthusiastic advocate of venesection (*De Sanguinis Missione*, Leyden, 1660). It should be done for plethora and when the blood was corrupt. Neither age, sex, nor constitution was a contra-indication to blood letting; but one ought not to withdraw too little blood. Two to three pounds should be withdrawn at one time, or at least a sufficient quantity to produce fainting. This was done both to protect against disease and to cure disease, and he held that it was false to assume that blood letting diminished the quantity of blood. Just as the quantity of milk in the breast is increased by suckling, so the removal of blood by venesection leads to the formation of fresh blood. The blood which was withdrawn was laden with waste matters, and was replaced by good pure healthy blood. The medical faculty of Paris opposed this cruel absurdity, but in spite of this protest and in spite of the rule which was made by this faculty forbidding venesection, yet the custom spread and extended in France, Italy and Spain unhindered until towards the end of the sixteenth century. All the protests of the more careful physicians and learned bodies did less to stop this barbarous practice than the satire of the immortal poet Molière in his *Malade imaginaire*. One of his choruses in dog-Latin runs: "Phlaebotomia, dolum medicorum, nec non pontum asinorum quia illa ordinando non requiritur magna scientia." Le Sage also at a later day wrote a satirical

chapter in his *Gil Blas* against the still prevailing evil. The witty Paracelsus, in Germany, ridiculed with no less scorn the unhappy followers of Galen who thought every one had too much blood. He does not condemn it altogether, but brings forward some astrological reasons against Galen's arbitrary practice. About this time calendars and rules were drawn up by physicians, and were used till the beginning of the nineteenth century. Besides weather prognostications there were also rules by which could be found the day on which blood letting should specially be performed. The oldest book of the kind is one by Franz Rapoldis, *Magnum et perpetuum Almanach*, Antwerp, 1551, but David Haarlich's book was more used and more popular.

Harvey's wonderful discovery brought certain modifications into the practice of venesection, and the contention as to which part of the body should be selected now ceased. But it was Helmont and his great reputation which checked this thirst for blood letting, both of the professional and of the unprofessional vampires.

The members of the iatro-chemical school of the seventeenth century, and among them Anton Portius at Rome, were enthusiastic opponents of blood letting. The blood is free from pollution and blood letting cannot therefore improve it, and plethora does not exist because there is too much blood in the body, but because the blood vessels are weak. If the contents of the blood vessels is withdrawn the weakness is increased and not diminished. Only when rupture of some vessel in an important situation is threatened is it permissible to withdraw blood. Suitable diet and bodily exercise are of more value in plethora than is blood letting.

In opposition to the iatro-chemists were the iatro-physicists who favoured venesection, and this is readily understood when we remember the theoretical idea about the nature of disease held by this school.

In the beginning of the eighteenth century a great contention arose between two equally well known and renowned physicians, Philip Hecquet and Jean Baptiste

Silva. The former considered venesection one of the best sedatives; the latter maintained that the sedative effect could be obtained by far less dangerous remedies.

Sydenham does not speak in favour of this absurd reckless and dangerous blood letting, but uses it as a prophylactic when acute disease threatens. Yet in spite of the authoritative utterance of this great man, the custom of blood letting could not be put an end to; and two opponents in other matters, Friedrich Hoffmann and Stahl, joined hands in energetically recommending venesection as a preventive against many diseases. It is probably in part due to the influence of these two men that in the eighteenth century almost every human being had himself bled at least twice every year, and that in addition to this every pregnant woman was bled before she was delivered. Venesection survived for a long time, and was fostered by the theories of Brown in England and of Broussais. It was homœopathy and the moderate Vienna medical school which succeeded at the beginning of the nineteenth century in dealing a decisive blow at this harmful custom.

There is much less to be said about cures by purgation and by sweating than about cures by blood letting. They were generally combined with blood letting. Purgation for the prevention of disease is a very old custom, both recommended by physicians and also in general use among the people. Hippocrates recommended asses' milk as a mild cure of this kind. It is probably correct to assume that these suggestions of Hippocrates did not undergo any great change till the sixteenth century, although asses' milk was sometimes replaced by one drug sometimes by another. Paracelsus ridiculed these methods of treatment, but the humours recommended by him are probably of no greater value than the treatment which he ridiculed. Helmont is also an opponent of purgatives. They cannot reach the "archeus," which is the cause of the corruption of the juices. On the contrary, they reduce the strength of the body and make it incapable of resisting the "archeus."

The iatro-chemical school indirectly advocated purgatives,

although they uttered a protest against purgative treatment. For fever, which they regarded as the expression of acidity, they ordered alkalies, and all of these purge more or less, so that they were in reality practising that treatment against which they protested. Even up to the present day purgation in treatment plays a large and important rôle.

Sweating cures have already been referred to in the section upon water supply. To cut short the illness at its beginning not only were baths given, but many hot beverages to cause sweating were recommended, such as hot lemonade. Vapour baths were employed for the same purpose, and were intended to rid the body of impurities. So too when there was a predisposition to rheumatic, gouty, or catarrhal disease. For such purposes they are still extensively used at the present day.

There are also many articles of diet and medicinal substances which are valued, not altogether without reason, as protective against certain diseases. Probably every race has some such traditional remedy in use, and it would be impossible to mention them all. The following are the most common among them.

We find the Roman writers ridiculing the populace as "smelling of garlic." Garlic is said to protect against malaria, and it is also said to protect against hydrophobia and the bites of poisonous insects, as well as against intestinal worms. How far this popular opinion, especially common amongst the southern peoples, rests upon correct observation is difficult to say.

It is known that the people of South Russia who live in malarial districts have from time immemorial prepared bitter drinks from plants which grow in the country, to which they ascribe virtue against malarial infection. Saffron was regarded by the ancient races as a valuable prophylactic. How old the custom of taking alcohol is it is impossible to say. History seems to show that every race makes use of some intoxicating drink or some intoxicating substance. Alcohol especially is said to protect against many kinds of disease, and this property has been

ascribed to it from time immemorial. Travellers in the tropics say that it has always been renowned as a protective against yellow fever and dysentery. Tobacco is said to be equally valuable, but has only been known in the old world since the discovery of America.

Under Louis XIII tobacco came to be used as snuff. It is said to have the property of protecting against several diseases. It is claimed that it relieves the brain and thus prevents all kinds of disease.

Smoking is reported to have been introduced among Spanish navigators about the middle of the seventeenth century. They said that it protected against various diseases at sea and also in foreign countries. Smoking tobacco has always been valued as a prophylactic, but whether this is correct must be left undecided. Sailors still chew tobacco to protect themselves against scurvy. It is well known, too, that navigators, especially in the northern seas, look upon acids, particularly citric acid, as possessing antiscorbutic properties.

Among drugs which are still today much prized as popular prophylactics are arsenic and quinine. The latter since its introduction has been used by everyone going to a malarious district, and for this purpose it appears to have fully deserved its reputation, and at the present time we know of no other drug which possesses such valuable properties as cinchona bark, or its alkaloid quinine. In mountainous districts arsenic has from time immemorial been used to prevent debility. The inhabitants of some districts (Steirmark, Tyrol, Salzburg) give very small doses of arsenic even to the children so as to accustom them to the poison. The dose of the arsenic is then increased, and they would not be able to give up its use without very injurious results. It is said that arsenic increases the power of work, makes climbing of mountains easier, and prevents the formation of goitre. The custom of eating arsenic is a very ancient one. History does not say who first introduced it nor when it was introduced, but the reputation of arsenic is not altogether without reason.

The value of bodily exercise in the prevention of disease

has been known from ancient times up to the present day. We need only mention Haller and Vieth, whose works give much information on this subject. Later, Rousseau and Basedow, basing their opinions upon this, devised reform in education. The new art of gymnastics was founded by Simon and Guthsmuths. The latter wrote his *Gymnastics for the Young* in 1793, and the modern exercises to keep the body in health are the outcome of this.

PART III

HISTORICAL ACCOUNT OF THE PREVENTION OF EPIDEMIC DISEASES

Diseases which spread from man to man and diseases which cling to certain localities have always given rise to public and private precautions. The means adopted to prevent these diseases varied according to the conception which was held as to their nature. The idea that they were of demonological origin led naturally to the adoption of demonological means such as magic, amulets and exorcism. The theological theory caused religious means to be used. The scientific conception of diseases and of their causes led us to adopt dietetic measures for prevention based upon scientific facts. Long ago the distinction was made between contagious diseases which to a certain extent are indigenous (endemic), and those which only from time to time visit a place as epidemics and then after a time disappear again. The former have been and are still regarded with some amount of indifference, while the outbreak of an epidemic always frightens and terrifies the people. Until quite recently little was done against those terrible endemic diseases scarlet fever and diphtheria. Isolation of the patient and inoculation against diphtheria are of very recent date, while long ago measures, clumsy though they may have been, were nevertheless used against leprosy, syphilis, cholera and plague.

I. SMALLPOX

As already stated, one of the oldest known preventive methods was inoculation against smallpox. Inoculation to protect against smallpox has been practised in China and India from time immemorial. It became general in Europe only a century ago. Still, even without considering the ancients, here and there preventive smallpox inoculation had been practised by different peoples in Europe. Thus for example, the inhabitants of the Caucasus tried to guard their children against disfigurement by smallpox. In Denmark, too, in various districts of France and in South Wales inoculation against smallpox appears to have been known before Jenner's time. In South Wales the operation was known as "buying the smallpox" in consequence of the belief that unless the person furnishing the lymph received some recompense, pecuniary or other, no result would accrue. An English physician, Sulten, tried to improve the method of inoculation by taking the lymph from the pustules of patients suffering from mild smallpox and conveying it to the arm of young children by the lancet point. To Sulten is due the credit of having exercised great care in inoculating so as to minimise the danger of the operation. Of 17,000 children whom he had inoculated up to the year 1767 only six or seven died from the inoculation. This inoculation was carried out in somewhat of a business-like fashion by Sulten. Everywhere he had agents who carried out his method with good results. The results were so brilliant that some physicians believed smallpox had altogether disappeared in England. Others believed that it would be possible to prevent an outbreak by giving various drugs. For this purpose Medicus recommended quinine; Vanderbōck and Boerhaave recommended antimony and mercury. These remedies were thought to be more efficacious than prophylactic inoculation. Until the eighties of the eighteenth century Junker and Faust recommended isolation of the patient as the best means for

checking smallpox. Edward Jenner, a medical practitioner residing at Berkeley in the vale of Gloucestershire, was led towards the discovery of vaccination by the casual remark of a young countrywoman who told him that milkmaids were immune to smallpox infection if they had been accidentally inoculated with cowpox while handling the udders of the cows in milking. This statement appears to have made a profound impression upon Jenner's mind, and after much inquiry and reflection he performed his first vaccination in May, 1796. The subject was James Phipps, a boy aged eight, who was vaccinated on his arms with matter from a vesicle on the hand of a dairymaid who had been infected with cowpox while milking. In the following July an unsuccessful attempt was made to inoculate Phipps with variolous matter. Two years later Jenner published his memorable *Inquiry*, and although his thesis was stoutly opposed, and some want of success attended his first efforts, he was subsequently able to establish an institute for vaccination in London. Soon afterwards a similar institution was established in Berlin by the celebrated Heim. Others were established in Vienna by Johann Carro, in Geneva by Odier, in Hanover by Strohmeyer and Ballhorn. It is surprising that the strong opposition to vaccination which in later times appeared, and at the present day still exists, was almost unknown when these institutions were founded. Protective inoculation with vaccine from arm to arm spread from land to land, and later became compulsory in most civilized countries. A poet wrote in 1802—

So rafft fast in allen Zonen
Die Blatternpest mit wilder Hand
Die Menschen hin zu Millionen,
Eh' die Vernunft ein Mittel fand,
Das uns, wenn man so weislich nützt,
Vor diesem Erdenübel schützt.

[In almost every zone smallpox struck down men by the million till a means was found which, wisely used, protects us against this evil.]

The experience of the Franco-German war showed that although protective for some years vaccination loses its protective effect after a certain lapse of time. And then in Germany and in certain other countries re-vaccination in the twelfth year of life was made compulsory. Unfortunately we have no similar prophylactic measures against other epidemic diseases.

Another disease against which prophylactic measures have been usefully employed for many years is malaria. The opinion that this serious disease is sometimes contracted by merely breathing the air of malarial districts is now known to be incorrect, as it as been shown by Koch and others that malaria is conveyed largely, if not entirely through the instrumentality of certain mosquitoes. Though this was not known in earlier times, yet it was tolerably certain that malaria was confined to marshy districts. And many of the ancient civilized races endeavoured to drain the marshy ground, and thus render it healthy. Some historical documents show that such efforts to drain districts were made in the remotest ages. Reliable information about this matter is first met with in history in connection with the Pontine Marshes. A large plain thirty to forty kilometres long and eight kilometres broad, lying to the south-east of Rome. separated from the sea by a tableland, was once one of the most flourishing districts. It is said that thirty-three towns stood there under the Volscians. Numerous canals drained the region, and fertile gardens and fruitful fields are said to have covered it. In the year 358 B.C. the Volscians were defeated by the Romans after several sanguinary battles, carried away from their homesteads and scattered. From that time the drainage works were neglected. The houses of the towns fell in, and the district became one of the worst in Europe. In spite of its fertility no one ventured to settle down there, for he would undoubtedly have fallen a victim to the pestilence. The practical Romans did not fail to try and restore this unhealthy region to its former flourishing con-

dition. It was thought that this would be possible by draining the Pontine Marshes, and so in the year 312 an attempt was made to provide the Via Appia with a system of drainage. These works were carried on by the consul Cornelius Cethegus, by Cæsar Augustus, Nerva, Trajan and Theodoric the Great, but were never completed. Eighteen popes repeated the attempt, but always with insufficient money and technical means. Finally Pius VI took the work in hand with sufficient means. The Via Appia, which in the meantime had completely fallen to pieces, was restored at an outlay of 7,000,000 lire. He built a long canal to drain it, with many branch ditches. This great effort was indeed crowned by some measure of success. Part of the devastated plain was restored to cultivation, but the greater part of it lies still in ruins and decay. Quite recently attempts have again been made by the Italian Government to improve the land by planting eucalyptus trees.

II. LEPROSY

We have already seen that the older races, especially the Jewish, sought to protect themselves from leprosy. The Old Testament tells us that lepers were obliged to dwell outside the camp, and that provision was made for them so as to avoid as far as possible all intercourse with them. The New Testament tells how the Saviour in His wanderings outside the town and in the vicinity of graveyards came across lepers who besought Him to help them. The Greeks appear not to have been familiar with the worst forms of leprosy (elephantiasis) and the ulcerating scabbed form. It would appear to have become more general at the time of the Crusades. Leprosy was in the middle ages what cholera has shown itself to be in our own time, "part of that force" which "makes for ill but works good." Not only the Crusades but other historical events too may have assisted the spread of leprosy, possibly the inroad of the Moors into Spain and the migration of nations. Although the word leprosy occurs frequently in the records of the

Arabians, it should be remembered that the expression is a general term and seems to denote several very different diseases, some of which are quite innocent. Among the Lombards special hygienic precautions were taken against leprosy during the reign of King Rotthard. The unfortunate lepers dwelt in special places outside the town. They were altogether excluded from social intercourse and to a certain extent regarded as civilly dead.

Two facts about the way in which leprosy was regarded show extremely well the character of the middle ages. On the one hand the greatest disregard and cruelty were shown to lepers; on the other hand a romantic enthusiasm was evinced for these lepers by those who saw in this plague the special grace of God. Both views led to the adoption of corresponding prophylactic measures. Sprengel writes, "When any one was pronounced to have leprosy, he was declared civilly dead with the most gruesome ceremonies. Then he was led into the church by a priest, exchanged his former dress for a black garment, and upon his head and breast were placed two woollen bands which were visible from afar. Then a requiem was said as at a funeral. The priest then took the leper into a house which stood alone, cautioned him never to appear in public in any other dress, to go about bare footed, and to avoid wells, churches and bakeries. Finally a shovel full of earth was thrown over the bare feet of the leper. The leper was from that moment regarded as civilly dead (just as are at the present day those who are of unsound mind) and could not sue at law or inherit or acquire property. He was only permitted to touch with a stick anything he wanted to buy, and as he went along he always made a noise with a rattle to give warning that he was coming."

It is evident that these scandalous rules were prompted by a desire to check the spread of the disease, but like all acts of cruelty it did little to accomplish its end. On the contrary, those so ignominiously treated were often embittered and gave vent to their bitterness by rising against their hardhearted oppressors and not seldom banded themselves together with other classes of persons, especially the

Jews, who were driven to desperation by the injustice of their fellow citizens.

But side by side with such cruelties other measures were resorted to as the outcome of the romantic tendency of the middle ages. We have already said that some believers looked upon the lepers as people specially favoured by God. And many orders were founded to undertake the care of lepers, the oldest order being that of the Knights of St. John, established in the seventh century by merchants in Amalfi. A document dating back to 1311 is still in existence which gives information about the organization of this order, which became so renowned later by its deeds in war, and about its hospitals. This order tried to moderate the severity of the civic laws against lepers. These patients were permitted to make their homes within the borders of the institution. They were permitted to marry and the married couple were dowered by the order. Four physicians looked after the physical welfare of the patients. The respect felt for lepers became so great, that in time the grand master was always selected from among them.

Thanks to the influence of this religious order, and possibly also from fear of infection, the benevolence of the public was aroused, and everywhere asylums for lepers were established called leper houses. There were also smaller huts for a few lepers, the so-called stellae and cucurbitae. Out of these institutions have arisen a large number of the hospitals and infirmaries of the present day. Until a few years ago the general hospital in Salzburg bore the inscription "Leper House."

III. VENEREAL DISEASE

There is no certain information about syphilis until the middle ages, when the disease was more common than ever before or since. If it is permissible to form an opinion about the spread of the disease from its names, this loathsome disease seems to have been carried into France from Italy (mal de Naples, souvenir de Milan), and from France into Germany (French disease). Whether the English law

about brothels in 1126 and its revival in 1430, threatening the brothel keepers with a fine if they take in diseased women and ordering a regular visitation by physicians, refers to syphilis is not clear. A similar order issued by King John of Naples is regarded by some historians (Haeser) as a forgery.

The prevention of syphilis, as carried out today in all civilized countries except England, i.e. regular examination of the women, does not date back further than the French Revolution. Brothels have existed from the earliest days and were under strict police control, but whether these were established for sanitary or criminal reasons is not evident. And of what use was an examination carried out without a speculum, and this has not been in use a hundred years? History shows moreover that syphilis has been commonest when prostitutes have been lodged in special houses, so that this appears to be of no prophylactic value. In the middle ages prostitution was sanctioned even by the clergy, and also taxed. It is difficult to say whether this encouragement of vice by laity and clergy was based upon any medicinal and prophylactic idea.

The renowned teacher of law, Rittershausen (who lived 1566–1613) says nothing about any such idea, but considers the existence of such houses to be necessary for the sake of morality.

Modern advocates of prophylaxis justify these degrading examinations by similar reasons, to check the spread of syphilis. The connection between syphilis and prostitution which is medically unregulated was recognized in France, so that at the time of the French Revolution regular inspection was instituted on the Continent in the same way in which it was already being carried out in England. But today England is probably the only country where such inspection is no longer made, though it is carried out more or less thoroughly everywhere else.

Permission to maintain houses for prostitution has sometimes been allowed and sometimes been refused, but always with a view of checking syphilis. In Vienna a decree forbidding such houses was issued under Maria Theresa,

and a similar law was made in Berlin in 1848. Thus it is difficult to decide whether the true idea of prevention of syphilis requires the closure of all such houses or not.

Regular inspection in the army and navy as regards syphilis commenced in England and has been in force in Germany for about a century.

IV. PLAGUE

This terrible pestilence has in modern times only been known in Europe in the first third of the nineteenth century. It has again and again threatened to invade civilized countries, and was one of the most terrible scourges in past centuries. In the fourteenth century nearly 25,000,000 people were swept away by it in Europe. Many towns were reduced to one quarter of their original number of inhabitants. The oldest records show that this was one of the most terrible of pestilences. Thucydides and Livy give descriptions of it which are among the most terrible pictures in the history of the world. And later Boccaccio has also described it. In Thucydides the plague broke out during the Peloponnesian war, decimated the Grecian cities, especially Athens, and reduced the fighting capacity of the troops so greatly that it required all the eloquence of Pericles to raise again the spirits of his countrymen. It is remarkable that the historian makes no mention of any prophylactic measures which were taken against the disease. From other quarters it is reported that Empedocles adopted extensive measures against the plague. When there was a great epidemic he had large fires made at different places in the towns to purify the air. He regarded the sirocco as the means by which plague was spread, and therefore wanted to close a cleft in the mountain by which this wind came.

Another suggestion made by the same physician seems more sensible and practicable : he suggested that fresh water should be carried into the river Hypsos at Selinos to remove the miasmatic effluvia ; but it is doubtful whether this was directed against plague or against malaria. In the whole mass of Greek literature we read of no really valuable attempt to combat plague epidemics. This attempt was

made only quite recently, and to explain the measures which were adopted we shall refer to the bubonic plague which recently appeared in South Europe.

In 1812 it appeared in Constantinople, soon afterwards in other towns in Turkey and Egypt. In one year some 12,000 people died of plague in Constantinople. It was carried to Odessa by ships, and 3,000 out of a population of 28,000 in that city succumbed to the disease. At the same time it spread from Constantinople to Bucharest, where a tenth part of the total population of 80,000 fell victims to plague. It also spread from Constantinople by the sea to Malta and some of the Grecian islands. In Malta it carried off 6,000 people. In 1815 the plague was still in Turkey, and was conveyed thence to the east coast of the kingdom of Naples. It broke out to the great alarm of Western Europe in Naja, a small seaport town of that kingdom, and in a short time killed 792 people.

For the first time we find strict prophylactic rules. The seaport town was strictly isolated, and moreover those ill with plague were taken to well supervised quarantine buildings. Ships from suspected seaports were not permitted to enter, and goods already unloaded were disinfected by exposure to superheated steam. These rules proved to be most efficacious. The plague was not only stamped out at Naja itself, but the whole of Italy and the greater part of the west of Europe escaped the infliction.

Again, in 1820 the oriental plague appeared in the Balearic Islands. Majorca alone lost 2,000 persons, Palma 8,000. The experience of Naja had not been in vain. Quarantine regulations were adopted against the infected islands and the plague stamped out.

In 1820 and 1829 cases of plague appeared again in Moldau. They did not extend far. Here and there smaller epidemics appeared: in 1872 in South Russia (Wetljanka); in 1899 in a laboratory in Vienna. But each time it was possible by strict isolation and quarantine to master the epidemic.

Epidemics of plague are of great historical interest in civilization quite apart from medical considerations,

because they left behind them the utmost desolation in the regions they attacked. Sometimes the physicians were sacrificed by the distracted populace; sometimes the officials were suspected of having poisoned the wells; sometimes the malice of the populace was directed against certain classes of the people who had escaped the plague. Thus, in the sixteenth century a rising against the Jews in Cologne broke out as the result of the plague, because the Jewish quarter had been little attacked by plague. In one day many thousands of these unfortunate people fell victims to the fanaticism of the populace, and the authorities were powerless to stem the tide of revolt. In 1830 the Jews were slaughtered in Cracow for the very opposite reason, because in an epidemic of cholera the Jewish quarter of the town suffered most. Such was the logic of the people and of the God-fearing clergy.

From descriptions of the plague we see that it was known in the nineteenth century to be spread by human intercourse on sea or on land. We see further that this knowledge led to the adoption of very stringent but also very successful measures. More recently other remarkable facts concerning the spread of plague have come to light. Research is now being made into the vital processes of the plague bacillus, and it is to be hoped that the important knowledge gained in the various laboratories will soon enable preventive inoculation to be employed successfully in relation to this disease. It is scarcely necessary to add that during the middle ages, when plague was regarded as a punishment from Heaven for the wickedness of men, attempts were made to appease the wrath of the Lord by prayers, processions and pilgrimages. Much greater interest is felt by us in

V. ASIATIC CHOLERA

If ever a scourge of God has prompted mankind to good deeds it is cholera. It is largely owing to this scourge that towns are nowadays supplied with good drinking water and with a regular system of drainage. The scientific work, too, which has to record such brilliant results during the last part of the nineteenth century, is also connected with

cholera. Halier's researches in bacillary diseases, Tiersch's experiments in which he inoculated white mice with cholera excreta, are closely connected with the last epidemics of cholera. And though these attempts to fight cholera have not been followed by any great result, yet they proved a stimulus for similar work in other diseases and have been valuable as introducing a new line along which science, especially medical science, can travel. It cannot be regarded as mere chance that the experiments of Pasteur and of Lister followed directly upon the cholera epidemic of 1866. Indeed if we look at the development of science historically, the connexion between the last great epidemic of cholera and the first translations of Charles Darwin into German will not escape notice. But in this place we shall not concern ourselves with the last cholera epidemic, when opinions as to the spread of the disease were already firmly established, but with the first which visited Europe to any great extent.

At the beginning of the nineteenth century the world had already fairly well advanced in science. Protection against epidemics was no longer sought by spiritual and ecclesiastical measures. The knowledge that the course of a pestilence could be influenced by customs and habits was already widespread. Physicians and reformers tried to regulate and improve the customs of the people, so as to make them more in consonance with the principles of health. The State recognized the necessity of employing physical methods to combat physical sources of ill. Cholera was not altogether unknown at its first appearance in Europe. Writers in classical antiquity—Celsus, Aretaeus, Caelius—describe an epidemic disease the symptoms of which agree very closely with those of cholera. Cholera seems also to have been in England from 1669–72; Sydenham and Willis mention it. Owing to the extraordinary lack of intercourse of those days epidemics spread very slowly and not very extensively.

In India cholera has been known since the remotest ages, though it is limited to a certain district—the delta of the Ganges. In 1817 a remarkable increase in the mortality from this disease occurred in this region. The

small town of Madia first attracted the notice of the English Government. Thence in 1817 cholera spread along the Ganges from place to place, from town to town. In Jessore, a somewhat larger town, it was alarmingly prevalent, yet but little was done to prevent its spread. Not till it reached Calcutta and carried away 200 persons every week (at that time the population of Calcutta numbered 600,000) did the English Government, in consequence of the proximity of one of its garrisons, begin to take active steps. Still nothing very radical was attempted, although official reports were drawn up. For two years cholera continued to be epidemic in Calcutta, and thence spread to the neighbouring Sundas, a garrison town with a large number of British troops, of whom 9,000 died from the disease. Then the Government ordered the removal of the garrison. They were removed to the mountains, and this caused the disappearance of the disease from the army. But from the delta of the Ganges it spread, as it were along radii, to all parts of India. Bombay, Madras, the Coromandel coast and Ceylon, lying to the south were in turn invaded. The epidemic on the island of Ceylon lasted from 1819–23. The disease had already overspread India. Then it appeared in Mauritius, which was 3,000 miles distant, and 6,000 persons succumbed to it.

In 1820–1 it reached the African coast. It spread also eastward from India to Sumatra, Java, Macao and China; and in 1821 it appeared at Pekin. From India it spread also to Celebes and Manilla. Rapid intercourse with the East quickly took it to the rest of India and Arabia. In 1821 it appeared at Bagdad, and spread thence along the great caravan road to Aleppo and Syria. It spread also from India north-west across Persia to Astrachan. For ten years cholera existed unchecked in the countries outside Europe, but except in Astrachan, where its progress had been checked, Europe had till then escaped cholera. In 1830 it broke out in Odessa. Two years later it had spread over the whole of Europe. In 1832 it had invaded central Germany, France, England, Holland, and thence spread to the United States of America.

At that time the following points had been definitely established in connexion with prophylaxis—

1. The ready transmissibility of cholera was viewed with alarm and was known to be connected with human intercourse. Whether it could be spread by goods was not evident. Whether it became epidemic in every place to which it was carried seemed at least doubtful. For some inexplicable reason some towns in Europe remained free from epidemic, though the disease had undeniably been introduced into them. There was no time to pause for reflection. The expensive method of quarantine was selected as it seemed to promise the best results. What the result was we shall now see.

When cholera broke out in 1830 in Russia it appeared outside Moscow. Strict quarantine of the residents was immediately ordered, and as it seemed with success. Dur- the whole of the quarantine period, extending over several months, no case of cholera appeared in the town itself. But this calm was but a deception, and soon there followed a bitter disillusion. In spite of the long period of quarantine the pestilence broke out in Moscow and thence spread along the highway towards St. Petersburg. St. Petersburg was then put in quarantine, and again apparently not without success. But here too, as in the case of Moscow, cholera broke out a few months after the quarantine regulations were removed. The political conditions of Russia at that time were the most favourable which could have existed for the spread of cholera. The last embittered revolutionary war was being waged by the Poles, who were endeavouring to throw off the yoke of Russia. All the hardships and trials which resulted from this war were so many favourable factors for the spread of cholera. When the Russian columns crossed the Austrian boundary and entered Galicia this pestilence followed. Galicia became a hotbed for cholera. A senseless regulation was made too late, and quarantine against Russia was established long after the pestilence had already broken out in Austria. Taking warning by Austria Prussia established an extensive military cordon to cut off communication with Russia. But this did not prevent the

cholera appearing in Dantzig on October 30, 1831. Isolation of Dantzig also proved quite ineffectual. Cholera spread thence without pause into the heart of Germany through Stalupönen and Posen to Breslau, and then to Madgeburg, Halle and Berlin. France too made an unsuccessful attempt to cut off communication with Germany. And when, in spite of this precaution, cholera broke out in Paris this costly and useless attempt was abandoned.

This, briefly, was the course taken by the first epidemic of cholera in Europe, which extended over so long a period. Quarantine and other regulations to isolated places had proved to be almost valueless. Since that cholera has often invaded Europe. War would seem to be the condition most favourable to spread cholera, as during the sanguinary war between Austria and Prussia in 1866. But the lessons in prophylaxis were not lost. This at least is certain: that quarantine, which proved to be so effectual against plague, has proved to be almost valueless in the case of cholera. Pettenkofer has done us the great service of showing what is necessary to check cholera. With unwearied eloquence the great investigator drew attention to the fact that the introduction of cholera into a place is only dangerous when that place is under conditions which are favourable to the development of cholera, and these conditions are sometimes a pestilential soil and sometimes polluted water.

Next we come to the present period in the history of cholera, and with this ends what we have to say about the history of the prophylaxis of this disease. We would only add that the most recent researches in the laboratory would seem to make it possible for each individual to protect himself, for a time at least, against cholera.

With these prophylactic regulations against the above mentioned diseases our historical material is exhausted. The measures adopted to prevent typhoid fever, typhus, scarlet fever, diphtheria, measles, whooping cough and influenza all belong to quite recent times. The prophylaxis of pneumonia and tuberculosis also dates back less than twenty years, though Gerhard told us at the

International Tuberculosis Congress in Berlin that in the eighteenth century regulations had been issued in Italy and Portugal ordering the isolation of tuberculous patients, forbidding things belonging to such patients being sold or given away, and imposing heavy fines on physicians who failed to notify the disease.

The prophylactic rules to prevent wound infection and puerperal fever are of older date. In 1869 in the Leipzig Clinic the first trial was made of Lister's antiseptic method. This was a very elaborate procedure and by no means applicable to all operations. Beneath the so-called protective, a piece of linen which had been previously dipped in carbolic oil and which was held up over the operating table by four assistants, the part of the body to be operated on was first well washed and the operation then performed. When the operation was over the protective was lowered and placed over the wound. A piece of tinfoil was smeared with putty containing one per cent. of carbolic acid, and was placed over the wound after quickly removing the protective. This tinfoil dressing was then secured by adhesive plaster and bandages. This clumsy and awkward method was gradually replaced by a better, and antiseptic methods have become aseptic in the course of thirty years. But all this is still within the memory of the present generation of medical men and need not be further detailed here.

In close connexion with the prophylactic treatment of wounds is the rational method by which lying-in women are protected against puerperal fever in lying-in institutions. The absurd theories held as to the origin of puerperal fever even in the sixties, and the opinion that this terrible disease could be prevented by costly systems of ventilation in lying-in hospitals, or by special nourishment during the puerperium or even by purgatives, have all been overthrown since the introduction of antiseptics. Although Semmelweiss had already in the fifties surmised the true aetiology of puerperal fever, although Burow had introduced into his clinic a kind of antiseptic method long before Lister, yet the warnings and the results of these two men were unheeded. Semmelweiss' most useful life ended in insanity

and suicide. And though Burow's end was not a tragic one, yet the value of his method was not appreciated. These facts show us that right ideas and truths are not accepted till their time has come. In the case of the antiseptic method we had not long to wait.

RETROSPECT

The foregoing shows the part which prophylaxis has played in the history of medicine. It has closely followed the theoretical ideas held about disease. It forms not only a part in the history of medicine but also in the history of civilization. We see that superstitious and religious ideas as well as scientific ones are responsible for the teaching about prevention of disease. Even at the present day, when hygiene is doing so very much in all the conditions of life, demonological and theological views as to the origin of disease are still widely held. Just as certain proverbs, sayings and fairy tales have come down to us from antiquity and are still uttered by the lips of children, so too demonological and theological precautions still enter into the childish minds of the people in spite of scientific research. But the Government measures against disease are no longer based upon these old ideas. A well devised system of prophylaxis based upon scientific knowledge will consist of scientific methods. And now that prophylaxis has followed the lead of science the results obtained have been very important. Probably no one would contradict us if we said, "Prophylaxis during the last half of the nineteenth century has done more to prevent disease than all that it did in previous centuries." Nevertheless the knowledge gained in the past has not been in vain and useless for the present. Just as a venerable tree yearly sheds its leaves, and these fall over its roots protecting them from atmospheric influences and providing nutriment for the plant by their decomposition, so too is it with the tree of knowledge. The wrong ideas, the errors, are like the leaves. They fall from the branches but protect the vitality of the tree, so that for many successive years it is able to adorn itself again and again with new foliage

General Prophylaxis

BY

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OF ROSTOCK

General Prophylaxis

WHAT is *general* prophylaxis? Prophylaxis includes the knowledge and the methods by means of which we prevent or at least endeavour to prevent disease; and the scope of general prophylaxis is the scientific inquiry as to whether this is on the whole possible, and in what way it may be done. The aim of hygiene however is similar. What then is the difference? For unless there is a difference, in spite of the similarity of their aim, we shall not be justified in allowing that prophylaxis is a branch of science distinct from hygiene.

In the first place, what is hygiene? Hygiene, said Reich, has for its object "the care of the whole physical and moral wellbeing of man, both individually and collectively, and the prevention of disease." Accordingly he regards hygiene "as the philosophy, science and art of normal life," and draws a sharp contrast between it and "the modern public sanitary authorities, whose main object seems to be the cleaning of cesspools and disinfection." Unquestionably this work too is beneficial to mankind, and prevents pestilences and much misery. But it is not hygiene: it is not the bond which links together physicians, statesmen, educationists and moralists; it is on the one side applied chemistry and physiology, and on the other a matter of police administration.

In contrast to this "general Hygiene" endeavours to advance the wellbeing of humanity in every direction: to influence medicine, education and religion, to improve the customs of the people and to give a wholesome impulse to all the conditions of life.

If hygiene were that bond "which includes all who are

working for the welfare of mankind and all who are striving after knowledge," then the very vastness of its aim and the vagueness of its task would frustrate its object. To the moral reformer who believes that crime and vice may be lessened by mastering the passions, the disinfection of cesspools may certainly seem work of little value. Modern hygiene as now promoted by the State, represented in all universities and discussed at congresses, is entirely free from all such utopian aims. It is an applied science, and as such is limited to the physical life of man, and has for its object "inquiry into the causes of disturbances in health and of disease, the prevention of these disturbances, and if that is no longer possible, the removal of such disturbances." The difficulties of the scientific conception of hygiene arise from the fact that it is not always easy to draw a sharp limiting line between it and allied subjects. If the object of hygiene is the prevention of disease, this presupposes the necessity of knowledge of the way in which diseases arise. But the determination of the causes of disease has been hitherto the domain of general and experimental pathology. Is this now to be transferred to hygiene? In part this has already been done. The important courses of bacteriology are given in Germany almost without exception in the department of hygiene and not of pathology; but this is explained by the historical development of this youngest branch of experimental pathology.

Hygiene is indeed and will remain an applied science, without any methods which are peculiar to itself. Though hygiene has a well defined area within which physics and chemistry, physiology and pathology work, yet each of these sciences has its own field of work and its own methods of research. Hygiene has to do with all these fields of science and accepts the methods of physical as well as of chemical and of biological research. But it has not the task of forming these methods. It makes use of all these to serve its own purposes, that is it uses them exclusively to promote health and prevent disease. Now that we know that the health of the community may be improved by

LEEDS & W. RIDING

good drainage and the scavenging of towns, the architect and the administrative officer who carry these out have become hygienists. In the prevention or removal of any pestilence by hygiene, not only is the physician needed to show what is the nature of the infectious germ, but the State and lawmakers must make regulations which shall prevent a spread of the infection. And when it has been shown that degeneration of the race may be prevented by State supervision in the selection of individuals fit for marriage, and when it has been shown that improvement can thus be brought about, then there will necessarily arise a demand, both social and hygienic, for new legal regulations about marriage.

Even if we abandon Reich's utopian ideas of improving the whole world in general by hygiene, and if we restrict hygiene strictly and exclusively to the realm of natural science, its scope will evidently still be very wide. As a social science, evolved in response to a social need, it is and must continue, as Hueppe says, to be social hygiene or else not exist at all. It is of service in maintaining and in improving the individual type, the race and the people; and its task is a far greater one than that implied by the term hygienic when this is used to express merely the medical art of preserving the lives of weakly or diseased individuals. Indeed it cannot be denied that here there is a great gulf, a dreadful contradiction, between the aims of the hygiene of the individual and the hygiene of the race. By hygiene as applied to an individual the physician strives to improve the life even of the most wretched human being, and his efforts are greater the more feeble is the individual; but the hygiene of the race has for its ultimate aim pitilessly to eliminate those of weakly constitution and thus to improve the whole people.

The solution of this contradiction is the hygienic problem of the future. If indeed the watchful care which is taken to protect weakly individuals threatens directly the soundness of the race, the question may arise whether, from the standpoint of this higher social hygiene, the philanthropic movements for providing institutions for the weakly

and crippled and so interfering with racial selection are not an evil. Our whole ethical sense is opposed to such a conclusion. There *must* be some solution which will reconcile the aims of the hygiene of the individual and the hygiene of the race, and utilize them both in the service of humanity. It is not our duty here to find this solution. It was only necessary to point out the sharply marked difference between the two. That which we term prophylaxis is medicine applied to the improvement of the individual; this alone concerns us in this textbook. The far greater and more extensive task of social hygiene—in which, in addition to physicians, lawgivers, government officials and engineers are engaged—lies beyond its scope.

In this limitation lies the scientific justification for a general and a special prophylaxis. In his capacity as an individual, as a citizen and a lawgiver, the physician ought to make himself familiar with the great problems of social hygiene. His purely medical duties are however somewhat different. These only require him to help the individual man who is ill and to guard against disease the healthy man who is entrusted to his care. By adopting these limits general hygiene and general prophylaxis do not come into conflict. Tradition says, whether correctly or incorrectly is not for me to determine, that the Chinaman pays his physician only so long as he remains well. The old and sensible custom, which nowadays is dying out, of having a family physician was based upon a similar idea, that an important if not the most important aim of medical skill lay in individual prophylaxis. This is impossible when the physician is paid for each separate visit to the family, and therefore goes only when expressly asked to call, for experience shows that he is not generally called till the mischief is done.

Individual prophylaxis should commence with the earliest training of the child. The family physician, in the good old sense of the word, knew thoroughly all the peculiarities of the family—both the good and the bad. Faithfully and preseveringly he studied the special disposition of each child. Thus he could assist the parents by warning and

advising them about the child, and so he was able to nurture the delicate little human plant into a strong weatherproof tree.

The more this useful work of the family physician is lost, the more pressing becomes the need for some substitute. In our time, with its socialistic tendencies, the State and the community are undertaking more and more this duty. What the members of the family fail to do is done by the State. And more than this. The supervision of the young, the regulation of their mode of life and conditions of development by the State and the community must more and more become such that it will be permitted to interfere with the freedom of the household arrangements when they are proved to be unhygienic. For these reasons school physicians will be necessary in the future. The duty of the school physician will be to see that general hygienic measures are carried out, that infection is prevented from spreading by timely isolation of the patient, that the schoolrooms are supplied with sufficient air and light, that mental and physical exercises are suitably varied, and so on ; and further if he will prove truly of value, he will look after individual prophylaxis also, because one plan is not applicable to all, and the amount of mental and bodily exercise which may be regarded as a normal average may be for some individuals a harmful excess.

Medical prophylaxis is accordingly a special branch of hygiene. It is the sum total of medical counsel and rules intended to protect the individual against disease. In this sense medical prophylaxis guides the individual through the entire course of life, from the cradle to the grave. Just as there are diseases peculiar to the infant, to the schoolboy and to the old man, so too must there be prophylactic measures suitable for the various periods of life. But these too must be modified and graduated according to the need of any individual, otherwise they may possibly do harm instead of good. To give an example : it is true that alcohol is nothing less than a poison in childhood, while in old age it is a valuable tonic and preservative. Yet in exceptional cases, in acute febrile debility, alcohol may be

a useful medicine for the child, and on the other hand, when there is arterio-sclerosis, and a tendency to apoplexy, it may be a poison to the old man. In the prevention, as in the question of production of disease, we must take into consideration the personal factor.

Individual prophylaxis assumes complete knowledge of the mode of origin of disease in the individual. The whole history of medicine shows that it has always been believed that, under precisely similar conditions, of two individuals one may fall ill while the other will remain well. Hence it follows that general pathology which is based essentially upon an experimental foundation, and studies the laws of the injurious effects produced by harmful agents upon all members of the same class, is unable to explain the cause of every case of disease. Disease may in some cases often be produced by conditions which are not general, that is they would not produce disease in every individual without exception. This can only be explained by the existence of some causal factor in that case which is not common to all the members of the class. All such individual factors which are inherent in the cells, tissues, or organs are termed constitutional. Whether this constitutional causative factor of disease be inherited or acquired, it must never be omitted from our consideration of the production of disease, unless we have to deal with an injury which is so severe and dangerous that no life or organic structure could resist it, such as traumatic destruction of the tissues, severe poisons and very virulent infections. These general causes of disease can only be prevented by one method of individual prophylaxis—their avoidance. The man who does not want to be wounded should do his best to avoid going to a place where there is shooting. He who lives in a district which is perfectly free from malaria and cholera will not get these diseases. This is so clear and self-evident, that it might seem as if the battle against external causes of disease were alone worth waging and were the only possible way in which disease could be prevented.

The history of vaccination has already shown that this is a complete error. That terrible pestilence, smallpox, has

almost completely disappeared from among us, not because we have discovered and destroyed the exciting cause of smallpox—which indeed is still unknown—and have thus prevented its spread in the world, but solely because we have succeeded in making every individual personally proof against this pestilence.[1] The application of this principle to other infective diseases marks one of the greatest advances in modern medicine. There are therefore two methods by which we may prevent or overcome infectious disease. We can prevent such disease either by destroying the exciting cause of the disease, by making it innocuous, by keeping it from coming into contact with individuals, or by a method which will strengthen, fortify and immunize those who are exposed to the disease. In epidemics of diseases coming from abroad, such as cholera and above all plague, we endeavour to protect ourselves solely or almost solely by restricting intercourse with infected people. We try to prevent the exciting cause of the disease from entering our country, and when in spite of all precautions the disease has nevertheless made its appearance, we isolate the individual affected and thus prevent further spread. In endemic infective diseases, such as tuberculosis, diphtheria, the acute exanthemata and typhoid, this method by itself is insufficient. To close the gate of the town is of no avail because the enemy is already within the walls. In such a case we may yet succeed if we remove the conditions necessary for the existence of the enemy which has already entered. Munich, Dantzig and Berlin, formerly hotbeds for typhoid fever, have been almost completely freed from the disease by drainage. Wherever the exciting causes of the disease are known to exist adequate measures must be taken. The destruction of tuberculous sputum by the patient himself is a social duty which is owing to humanity, and the State will have to consider how far it is justified in insisting upon the isolation of patients with infectious disease without unduly interfering with household arrangements.

[1] This applies to Germany rather than to Great Britain. [Translator.]

But all these measures belong to general or State hygiene. What then is the work of individual medical prophylaxis? There remains for it a wide and most useful field of work in strengthening and fortifying the individual himself. Immunization, as is evident in connection with smallpox, can be carried out by the State. But at the present time smallpox is still the exception. To bring up a weakly child who may also be hereditarily tainted, so that it does not succumb to the threatening danger of tuberculous infection, is individual medical prophylaxis.

This is the more true when we deal with diseases in which the constitutional factor predominates, and the exciting cause—the so-called "external cause"—is a minor one. The large group of functional neuroses and of diseases of metabolism belong to this class. The greater the predisposition, the less the exciting cause which suffices to produce the disease. The common causative factors peculiar to any disease, that is those which would cause disease in an individual of average strength, do not exist in these cases. Tubercle bacilli and alcohol are both causes of disease, and there is a strong agitation against both. Yet it would be radically wrong to estimate them alike, so far as concerns the production of disease. Alcohol is a poison only when taken in a given quantity, and this quantity is very different for different individuals. One with a congenital tendency to neurasthenia will not be able to take the amount of alcohol which for the healthy man is a harmless and pleasant stimulant: and individual prophylaxis must take this into consideration.

And what is true of alcohol is also true for other stimulants and pleasures: for tobacco, tea and coffee, and for sports, sexual intercourse and mental exertion. The duty of the physician is to estimate the relative amount which in any particular individual would cause disease.

But how can this relative estimate of the specific tendency to disease be made? This is a weighty problem, and upon the answer the possibility of individual prophylaxis in a scientific sense will stand or fall.

Many pathologists whose work is concerned with "external" causes which under all circumstances produce pathological changes, only make use of the term predisposition when they have nothing else upon which to fall back. It must be confessed that the vague expressions, a weak or a strong constitution, a lymphatic or an arthritic diathesis, do not help us much; because generally the diagnosis of such a condition in any individual is only possible after the disease has shown itself. When we say that one who suffers from liver disease has a bilious constitution, or that one who has had an attack of cerebral haemorrhage has an apoplectic tendency, the statement is quite valueless. That is evident directly we think at all about individual prophylaxis. The history of medicine tells of many different attempts to put this ancient vague idea of a constitutional tendency into some definite exact terms. Mostly an anatomical basis was chosen. Beneke worked it out into a system thirty years ago from this standpoint. He determined the relative size of organs in various constitutions by measuring and weighing them after death, and looked upon these measurements as exact expressions of those constitutions. This laborious work of Beneke's has been quite useless, and the reason of this is evident from a consideration of the subject of individual prophylaxis. When a person's constitution makes him especially liable to contract any disease and we desire to protect him from this danger by regulating his manner of life, and by keeping him away from sources of specific infection, the measurement of the length of his intestine and the width of his arteries and the volume of his heart and lungs after death are entirely useless. Moreover it is less a question of the relative size of his organs than of their relative functional capacity. And the individual variations in this can be determined for most organs before the disease sets in, by exact physical and chemical examination. This is the method towards which clinical medicine now points. It is purely clinical. The individual and the special tendencies of his organs are themselves carefully studied and

considered. It is most useful because it enables us to draw up a scientific scheme of exact individual prophylaxis.

The physician for mental diseases is for the most part accustomed to take into consideration great and definite differences in the personal predisposition of his patients. The brain is the most highly developed and therefore the most highly differentiated organ in the human body. It is a well established fact that this differentiation has its material substratum. But this is scarcely perceptible anatomically. Whether the attempt by Möbius to revive Gall's phrenology will be of any use remains to be seen. For the present we fall back upon determining the functional capacity, and this can be done very exactly. A well trained teacher—unfortunately they are not all so—knows well the specific "tendencies" of his scholars and takes them into consideration. Such specific tendencies may also be negative. There may be congenital functional inferiority of will-power, of feeling, or of intellect. Individual prophylaxis by physician and by teacher is then called for. Unfortunately "individualization" in this sense conveys to many no meaning. The time will come when individual prophylaxis, founded upon scientific observation and determination of functional capacity, will play an important part in teaching. Theoretically, at least, individualization would appear to be taken into consideration in the treatment of patients, if we can believe the prospectuses of the numerous dietetic institutions and institutions for the cure of nervous disease. But how is it really in practice? How can such individualization be learned, while the pathology and treatment taught at the universities are exclusively general pathology and treatment—that is while students are taught what is true only about the average human being? Take as an example the effect of drugs. Our knowledge of them is their typical effect: that is their effect on the average normal man. Individual deviations from this type, and the by-effects systematically studied by Lewin, are regarded by most physicians merely as interesting curiosities, and are put down to "idiosyncrasies."

Yet they are of immense scientific value in the study of the production and prevention of disease in the individual. Striking and great deviations from the typical action of drugs met with in certain individuals, such as intolerance of alcohol, morphine, antipyrin, or iron, show that there is some abnormal nervous predisposition which the physician should take into consideration, not only in the treatment but also in the prevention of disease. The modern trained physician for nervous diseases has long been accustomed to be very cautious in prescribing the various so-called nervines to his patients, and conversely the appearance of any so-called idiosyncrasy in a patient would be to him a sign of a special nervous diathesis.

The alcohol question, which is becoming more and more urgent, can neither be understood nor solved apart from the view of the production of disease. There are individuals with badly developed nervous systems to whom alcohol is an absolute poison, but to wish to deprive the large majority of men of alcohol, though their nervous systems are strong enough not to be injured by a moderate use of wine, a harmless and therefore an excellent stimulant, would be to throw away the good with the bad. Conversely he who does not yet know how injurious even a moderate use of alcohol is to children and to those with a tendency to neurasthenia cannot claim to have any knowledge of prophylaxis.

That favourite catchword, "individualization," is at the present time even more meaningless when applied to weak conditions of other organs than when used of functional neuroses. Yet in most cases hereditary inefficiency of other organs may generally be determined by a careful estimation of their functional capacity even before it has given rise to any real disease. A scientific prophylaxis is only possible when we know what special organic weakness is present, that is what individual predisposition to disease exists. A great and far-reaching task is before us in this field of clinical inquiry, in which, equipped with all the means of modern scientific methods, we endeavour to determine from what diseases an individual who is still healthy will be

likely or liable to suffer. The proof that there is a constitutional albuminuria or glycosuria may be taken as a typical example. Those who desire further information about this subject and about the problems still to be solved are referred to the fourth chapter of my book, "The Production of Internal Diseases" (Vienna, 1900).

One other question arises. Some causes of disease can be got rid of and banished from the world. Is it possible also to avoid predisposition to disease? That is the question and it is obviously quite different from the question previously put, namely how the outbreak of a disease may be prevented for which there is an hereditary predisposition. To answer the question we need to know whence came the predisposition, how it arose, and what conditions and factors caused its development. We distinguish between acquired and inherited predispositions to disease. The former arise through external causes which are also the causes of real diseases. Measles and influenza "predispose" to tuberculosis, and so too does diabetes. Tabes dorsalis and general paralysis of the insane develop in a syphilitic constitution. Prophylaxis for the prevention of such acquired predispositions coincides with prophylaxis of the predisposing illness itself. Whatever opinion one may hold about the connexion between syphilis and locomotor ataxia, it is certain that an individual who has not had syphilis will be far less likely to have tabes than one who has formerly had syphilis. The direct prophylaxis of syphilis is also an indirect prophylaxis of tabes. But when the syphilitic constitution is already present, and there is therefore an acquired predisposition to tabes, special prophylaxis is required to prevent locomotor ataxia. Syphilis greatly reduces the resisting power of the peripheral sensory neurones against external injuries such as colds and excessive strains. One who has been infected with syphilis should therefore beware of exposing himself to such injurious conditions, and this may be a matter of considerable importance, for instance in connexion with campaigns. A predisposition to a disease will be much more serious when the predisposition has not been acquired by the action of any external in-

jurious causes. It is then generally termed congenital or hereditary. Many physicians regard the two, congenital and hereditary, as identical, and this is much to be regretted as it leads to want of clear clinical judgment. It is obvious that anything which is congenital must in some way have been inherited, that is it comes from the parents. The term hereditary is however often not used in this general sense. We are accustomed to speak of hereditary disease only when it can be shown that one or more ancestors have suffered from the same disease. This want of precision leads on the one hand to the denial of any predisposition to tuberculosis in a tuberculous patient whose parents or grandparents were free from tuberculous disease, and on the other hand makes us speak of an epileptic tendency—say in an epileptic—because an aunt only happened to be epileptic. Both are unreliable statements. The first fact is not sufficient to exclude a specific predisposition in that individual, nor the second sufficient to establish such a predisposition. The problem of heredity in pathology suffers from a confusion of ideas which can here be only briefly referred to and cannot be fully discussed. The principal points to be considered in heredity are probably as follows—A "disease" is never inherited. To hold such a view would be an unscientific return to a theory of disease which was abandoned long ago. Disease is not a "thing," it is neither an object nor a property, but it is a process which developes and progresses upon a given substratum. Neither epilepsy nor phthisis can be demonstrated on the dead subject or stained for the microscope, or grown as a pure culture. What we see is the organ which has been attacked by the disease, the anatomical and histological changes brought about in the organ; and we can see the external exciting cause of the process. If the child is born with well marked anatomical changes, then we have a case of disease of true intra-uterine development. A child with congenital syphilis, which is born with evident signs of syphilitic disease, has suffered intra-uterine infection. The disease is congenital. But this process has nothing to do with the problem of heredity. It is hardly different when

a child is born apparently healthy—that is so far as we can judge—or really healthy, then later it becomes ill without any apparent external cause. In the case of microbic diseases there is then the possibility that the exciting cause of the disease (the tubercle bacillus or the unknown microbe of syphilis) was born with the child, though it had not yet become possible for it to cause any pathological effects, and this possibility occurs only in extra-uterine life. Such cases are rare but they do occur, for example in tuberculosis. But this knowledge does not in any way aid in solving the problem of heredity. In this instance also it is obviously a case of intra-uterine infection. Indeed these cases need not to be separated from the former where intra-uterine infection had produced intra-uterine disease. This fact needs to be emphasized in any discussion. That the true problem of heredity is not touched by the question as to whether and how far we are to accept the fact of an intra-uterine infection, will be evident when we remember that the chief hereditary diseases are not infective diseases. What is it that is transmitted by heredity in mental and nervous diseases, in diseases of metabolism, or in the so-called constitutional diseases which are justly termed hereditary? It is merely a certain weakness of some organ or tissue, a specific kind of vital inefficiency which renders that organ or structure more susceptible to external injurious influences than is a normal organ. That there is such a congenital specific inferiority of various structures, organs or systems in the body has been shown by clinical experience for over a thousand years, and can also be proved in an individual by careful examination of his functional capacity. The question, to put it briefly, is whether such predisposition to disease is and must be inherited, and what are the conditions under which it is transmitted. Such is the scientific problem of heredity, upon the solution of which alone depends the possibility of prophylaxis.

It is a matter of no importance whether such prophylaxis takes the form of a general prophylaxis under the care of the State or of an individual prophylaxis under the care of a

physician. In both cases it will be necessary in the first place to forbid certain individuals from marrying. The suggestion recently made, apparently with all seriousness, of submitting all degenerates to castration cannot for the present be entertained. Therefore by the urgent advice of the family physician, who however cannot compel its adoption, or by laws enacted by the State, we should be justified in forbidding marriage in certain cases, cases in which the hereditary transmission of some specific tendency to disease is certain or extremely probable. Which are these? One need but put the question in practice and difference of opinion at once begins. The single point about which all are agreed is that those who have any manifestations of syphilis should not marry. But here it is not a question of true heredity but of intra-uterine infection, and this must obviously be prevented. In tuberculosis doubt at once begins. Intra-uterine infection is known, but it is so rare that it is very questionable whether we are justified in forbidding all phthisical individuals to marry. And what is the probability of the hereditary transmission of the tuberculous predisposition? How in any individual case is it possible to judge whether such transmission is possible, probable, or even certain?

And now with regard to the true hereditary diseases. There is no doubt that there are apoplectic families and diabetic families, psychopathic and nervous families; that is families in which the special disease occurs frequently. But what is meant by "family"? What is included in the term? Those only who bear the same name? This would exclude the female side in heredity. The science of genealogy—a special science having its own methods—knows this and tries to avoid such cardinal mistakes. The statements in many medical books and treatises about inheritance of pathological conditions are neither more nor less than a collection of anecdotes without any critical inquiry.

Any really useful prophylaxis against hereditary disease will only be possible when the heredity problem in its

relation to the production of disease has been to some extent cleared up. I must content myself with these brief remarks to show that there is a scientific basis for general prophylaxis.

The outcome of what has been said is that in addition to the received general and special hygiene, there is also a general and special prophylaxis which deserves to be worked out scientifically and practically. We understand by it the sum of all purely and exclusively medical knowledge and measures whose object is the prevention of disease. These are in part general and in part individual. The general prophylactic measures are those directed against agents which are equally injurious for and will produce disease in all individuals belonging to the group. Individual prophylaxis presumes the existence of some constitutional factor which will cause the development of disease in some one individual. The one is a complement to the other and passes over into it without any sharp line of demarcation. The more general the measure, the more does it become a hygienic work in which not only the physician but also the engineer, the legislature and the educated classes take part. The special work of the physician, on the other hand, is the greater the more it is a question of recognizing and removing the individual factors of disease, that is to say predispositions to disease. The last-named factor is a much more important cause of the development of disease than is usually believed, and there is no danger for the present that the physician will have to give place to the sanitarian. On the contrary, individual prophylaxis is one of the most important clinical tasks for the future.

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The Prevention of Internal Diseases

The Prevention of Internal Diseases

Owing to the varying nature of internal diseases, their preventive treatment differs in certain particulars from that required in other groups of disease. In surgery and the allied branches of medicine, external injurious influences play a very large part in the aetiology of disease, while the constitution of the individual himself is less often a prominent factor. In such circumstances prophylaxis is concerned with the prevention and removal of these injurious influences which are external to the individual, rather than with the individual himself. It is of course not altogether a matter of indifference who the person is who slips down and falls upon his outstretched hand, or who it is that runs an infected pin into his fingers. The brittle radius of an old man will be more likely to break than the radius of a young man; and the pin will only pass through the thick outer horny layer of the skin of the labourer's hard hand, while it will penetrate also the deeper layers of a more delicate skin, and the poison will be deposited there and set up an inflammatory reaction. In such cases prophylaxis has not to make the bones more capable of offering resistance or the skin thicker, but has merely to direct itself against the harmful external cause.

It is otherwise with internal medicine. Here we can only partially succeed in removing the exciting cause of the disease or in discovering specific remedies. Our main concern must be so to act upon the functions of one or more of the bodily organs that the natural powers of resistance of the body against the exciting cause of the disease may be increased. Consequently in our preventive treatment we have more and more to consider the indivi-

dual himself and his bodily constitution with its acquired and its inherited peculiarities, and its power of resisting injurious influences. As a rule these internal diseases arise because there is a disproportion between the functional activity of an organ and the functional requirements. Under normal conditions of the body these two correspond exactly; an increase in the functional demands is accompanied by an increase in functional activity; a decrease in the demands by a decrease in activity. The normal body is able to adapt itself, in the sense in which Darwin used the term, not only to its general surroundings—the climatic conditions, the food and the other conditions of life—but also to any special demands which are brought to bear upon it. These influences may be mechanical in their nature, such as powerful muscular efforts which it meets by increased metabolism, increased circulation and deeper respiration; or they may be sudden changes of temperature to which the skin is exposed and which are promptly compensated for by contraction or dilatation of the cutaneous vessels; or again they may be bacteria which have got into the respiratory passages or into the digestive tract, and are overcome by the action of the epithelium or are expelled from the body by a violent coughing effort in the one case or by increased peristalsis in the other.

There is however a natural limit to the demands which may be made upon the organism, and when this limit is exceeded the organism suffers. The body, or generally that part of the body which is attacked, then undergoes a change which leads to further changes—functional or anatomical. These changes are accompanied by a temporary or permanent weakening of the body, and the condition is then called morbid. This process of "pathological reaction" is not essentially different from the above mentioned process of "physiological reaction." Often the one passes imperceptibly into the other, so that the difference is merely one of degree; but the results brought about by the two processes are very different, the physiological reaction is quickly over, the pathological reaction lasts more or less long and always weakens the organism.

The exciting causes, the stimuli, are essentially the same in both processes; different organisms, and even the same organism at different times, will react differently to the same stimulus. A cold current of air in one case will call forth adequate functional activity of the cutaneous vessels, and the effect of the cold air upon the body will be exactly balanced: this is physiological reaction. While in another case the cold air produces hyperaemia and then bronchitis or some other disease. This is pathological reaction. A dish of "Sauerkraut" will cause a violent attack of gastro-intestinal catarrh in one man, while another man will thoroughly enjoy the same dish! Thus the various known exciting causes of disease—such as cold and other atmospheric conditions, getting wet through, excess in eating and drinking, strains, poisons, and the entry of bacteria into the body—do not always cause disease, but only when they chance to reach a body which is prepared to react pathologically. The kind of reaction by which the body responds to any stimulus depends upon peculiarities for which we are seldom able to find an anatomical explanation, and they are said to rest upon the general constitution. A good constitution would be one which could adapt itself to all influences of life, to which it would always "react physiologically." In truth no such "good constitution" exists, and we are content to describe a man as possessing a good or healthy constitution when it suffers no ill effect from the ordinary stimuli of daily life. The standard for health is not the same for all men: one man can do hard physical labour with ease, thanks to his strong muscular system, but a sudden change in the weather or a chill will often give him a cold; and conversely, another man has little power of doing hard physical work but never takes cold. The body is not capable of meeting all demands upon it equally. So long as there is nothing obviously wrong in any organism and it is able to do its ordinary work with comfort, it may be considered healthy.

A weak constitution does not necessarily give rise to disease whenever it is exposed to injurious conditions. One man with a weak constitution may continue in good

health for many years and may not suffer from illness brought on by his constitution until middle life; we need but mention gout and diabetes as examples. In other cases again various symptoms may appear early though it cannot be said that any disease is present; medically these symptoms indicate a definite kind of constitution, and the disease appears later when called forth by some exciting cause. These symptoms characteristic of a certain constitution may however again disappear and no disease be developed; the constitution of an individual is not fixed and incapable of modification, but may be altered by the different conditions of daily life. The constitution depends, first upon inherited predisposition, and next upon the acquired peculiarities of the organism. An originally strong constitution may under unfavourable conditions become a bad constitution, and conversely a weak constitution may be strengthened by favourable circumstances and the disease peculiar to that weak constitution never be developed.

In these cases the objects of prophylactic treatment are self-evident. Firstly our duty is to prevent or remove all injurious external conditions which experience has shown will contribute to the development of disease; secondly our duty is to strengthen or improve the faulty constitution and thus remove the predisposition to disease. It is essential that we should recognize early the existence of a predisposition, and this is made possible by—

Firstly: a knowledge of the hereditary tendency of certain diseases;

Secondly: a knowledge of the definite signs and early manifestations peculiar to a certain constitution, particularly during the years of growth; and

Thirdly: a knowledge of the changes in the constitution and functions of the organism which often follow an illness, which appear at certain epochs of life and which accompany a complete change in the conditions of existence.

The prophylactic measures to improve the constitution cannot be enumerated once for all, because they differ according to the organ or symptom upon the defective nature of which the faulty constitution rests. All diseases indeed

are in a way constitutional. Whether the disease be one affecting the heart, the lungs, or the processes of metabolism, or whether it be a so-called infective disease, there is a certain predisposition to it in the particular individual, and when some external injurious factor is added the disease developes. The differences between the various diseases depend upon the part of the body affected, the constitution and the external harmful influences which have combined to produce the disease. In most so-called infective diseases the last named factor—infection—predominates, and the constitution is of comparatively slight importance: for example, malignant anthrax is a disease which probably always developes when the bacillus anthracis enters the body. The cholera vibrio however is occasionally found in the evacuations of healthy people. In tuberculosis constitutional predisposition is the most important factor.

And further, the course run by these diseases is not the same in every individual. Not only may the final consequences of any disease be different, but their whole clinical course and sometimes even their pathological and anatomical forms may be different in different individuals. This is daily seen in tuberculosis by every doctor. In epidemics too, where there cannot be very great differences in the degree of virulence of the poison, we see nevertheless very great differences in the severity of the attack depending upon the individual who is affected, that is upon his constitution. The same is also true for all other diseases: whatever be the external exciting cause, the constitution nevertheless determines the course which the disease runs.

Although it is now evident that almost all internal diseases are to a certain extent constitutional, yet in medicine we have long been accustomed to give the name of "constitutional disease" to a certain number of diseases, mostly diseases of the blood, such as anaemia, chlorosis, leukaemia, haemophilia and scurvy. We generally also include disorders of metabolism, such as gout, diabetes, obesity, rickets and scrofula. These diseases do indeed

possess certain characteristics which distinguish them from other groups of diseases. They run a chronic course and from their very beginning affect the whole organism, and though some external condition may help to cause the disease, yet any very obvious and tangible exciting cause is wanting. The constitution is essentially the determining cause, and the peculiarity of the constitution is generally inherited. Nevertheless no really fundamental difference separates these diseases from the rest, and there are intermediate forms which connect these two groups. We need only mention tuberculosis as an example, for some writers describe it under "the infectious diseases," others under "constitutional affections," and others under diseases of the lungs. From what has been said above about constitution it is obvious that any classification of diseases into groups must be artificial, but it is convenient for the study of diseases.

Ebstein groups the diseases we have mentioned under "diseases of the protoplasm," and Immermann under "general disorders of nutrition." This would compel us to include under the disorders of nutrition such a disease as hereditary and constitutional syphilis, and those diseases in which there is a chronic state of malnutrition as in the cachexias of cancer and malaria. It seems best therefore to consider the prevention of the diseases of the blood and of the disorders of metabolism in the narrower sense, separately from the rest.

The Prevention of Diseases of the Blood

BY

DR. ROSEN

The Prevention of Diseases of the Blood

Conditions of anaemia are so numerous and aetiologically so different that they cannot be prevented by any single method of prophylactic treatment: for instance anaemia may arise suddenly from severe haemorrhage, or it may be a sequela of some severe febrile disease, or it may be chronic and secondary to some morbid condition; for all these varieties the prophylactic treatment cannot be the same. The ordinary simple anaemia which is so common and gives rise to no symptoms in itself, can scarcely be called a disease, but it becomes a disease when diminished functional activity and other general disturbances are associated with the anaemia. It is met with mostly in women during the second decade of life, and aetiologically has much in common with chlorosis, and the prophylactic treatment of the two is essentially the same. Premonitory signs of this disease often appear during childhood; these children are pale, their muscles are flabby and their appetite bad, and they take every possible ailment, and especially they readily catch cold and are a great trouble to the family physician. Their "delicate health" is partly the outcome of heredity, partly the result of improper bringing-up. Moreover during puberty young girls in civilized countries are so much troubled with anaemia and chlorosis, that prophylactic measures are suitable for nearly all of them.

The old medical textbooks recommend plenty of meat, not only as a valuable remedy in anaemia and chlorosis but also as a preventive. But our views about the supreme value of a diet consisting largely of meat or of nitrogenous food have been completely changed by the great advances

made during the last decade in the physiology of food, by Voit, Pettenkofer and Rubner; moreover anaemia and chlorosis are not primarily disorders of nutrition, but primary disorders of the formation of blood which are not dependent upon the nutrition of the body. Naturally, insufficient nourishing food for any length of time will reduce the activity of the organs which form blood, as it does in the case of all other organs. Conversely when the circulation is defective the organs of absorption finally suffer too. In the prophylactic treatment of anaemia and chlorosis there is no indication to depart from ordinary diet. The diet should include the three principal kinds of food in the proportions which the principles of physiology have shown to be necessary. Cereals should predominate in quantity, and half a pound of meat daily on an average is sufficient. The diet of women who work in the factories of large towns is generally insufficient: it does not contain enough nitrogenous food, because the foods rich in nitrogen, such as meat and eggs, are too expensive for them. It may be well here, in connexion with the diet of poor people, to point out that the increase and extension of sea fisheries have made fish very cheap, whether fresh, smoked or dried, as cod, haddock and sturgeon. Recent attempts to make artificial nitrogenous preparations, such as "tropon" by Finkler, deserve attention, but for the present need not be considered as entering into the diet of the masses; moreover tropon is readily deposited in fine powder from its solutions, and is not enjoyed when taken for any length of time.

In addition to a suitable diet the prophylactic treatment of anaemia and chlorosis includes an hygienic mode of life during growing youth. It is one of the difficult duties of the family physician to arrange this. This subject however belongs rather to general hygiene and cannot be described here, though a few of the most important points may be named. As to games: it is good that girls nowadays play more at games and thereby get out more into the fresh air, use their muscles and increase their metabolism. But we must caution them against overdoing it, because over-fatigue and over-exertion lead to anaemia and chlorosis.

Girls who go out to service where the work is hard often get chlorosis though the surrounding external conditions are good and healthy, and the chlorosis improves directly the girls leave service for a few weeks' rest. Girls should therefore not be sent out to service too young, not before they are seventeen or eighteen years of age, even though they may look strong and well-developed. Among factory girls and shop girls in large towns, who so very often suffer from anaemia and chlorosis, generally combined with nervous debility and other secondary ailments, over-strain by working beyond their powers is a very important causative factor. They leave their home, already feeling weak in muscle and nerve, are occupied the whole day with their work, the monotonous nature of which is in itself tiring, and in addition have often to walk a long distance to get from their home on the outskirts of the town to their work near the centre. Experience shows that very few of them ride to their work: they walk there and back in order to save the fares. Imagine a weakly girl who gets up between five and six o'clock in the morning, then has an hour or perhaps more to walk to her work, works there till evening with a short interval at midday, standing or walking about much, she has an hour's walk or more home in the evening to her supper when she is tired and done up; and this meal is the principal meal in the day. At midday these girls generally eat in the factory a slice of bread and butter only which they have brought with them from home. These girls on reaching home at night are often so depressed that they have no appetite for supper and go to bed overtired and without having had sufficient food. And then anaemia and chlorosis with nervous debility and other diseases do not fail to appear. Medical treatment can often do much for these girls by ordering them to ride home at night: in a short time one generally hears that they have a better appetite in the evening and feel refreshed and sleep better at night. It is therefore most essential that the physician should find out exactly how much work each girl does. In many cases he will consider it necessary to curtail the work, not by reducing the work actually done at the factory,

but by cutting off other avoidable forms of work and exercise.

The conditions are again different with people whose occupation is almost entirely mental and who are obliged to sit in their rooms all the day. In this connection we must consider schools, especially high schools, whose methods of education we are endeavouring at the present time to reform. We need only mention here the great questions of overstrain and the substitution of natural science for some of the other studies and the use of object lessons. Gymnastic exercises are receiving greater attention in schools, but they are sometimes injudiciously given in the early hours of the day instead of at the close of the morning or still better during the afternoon. When given in the early hours the tiredness left after gymnastic exercises prevents proper attention being given to the lessons which follow. Harmonious development of body and mind is wanted for the young; unequal development injures both body and mind, checks the natural cheerfulness of youth and makes them pale-cheeked and peevish pessimists. Unfortunately the parents often from lack of judgment and from vanity spur on their weak children to exclusively mental work, that they may take the first places at school and bring home brilliant school reports, while their bodily development remains far behind the average for their age. To interfere in these cases will be one of the important duties of school physicians; long lasting severe anaemic conditions often enough result from such forced mental development and neglect of the body, and it is therefore well to take these children away from school for half-a-year, utilizing this period to rest the brain entirely and to strengthen the weak body by suitable diet, moderate exercise in the fresh air, cool baths and similar measures.

In adults too, the severe mental work of professional life and of other callings which are sedentary often leads to anaemia and its consequences, and what has been recommended for school children is required for these cases also. The patient should follow hygienic rules and get sufficient bodily exercise out of doors by sports and by walking.

Unfortunately ball games in the open air for adults are not yet the custom in Germany as they are in England; and for the sake of our health it is much to be regretted that these games are considered undignified for the adult. The appropriate interchange between rest and active movement in these games, and the enjoyment they give are excellent both for body and mind.

The connection between sexual processes and anaemia and chlorosis needs mention in relation to prophylaxis, especially in the female sex, in whom this connection is so often seen, chiefly at the time when the catamenia first appear. The essential nature of this connection which we meet with daily in medical practice is as little understood as is that of chlorosis itself. With the changes in the entire circulatory system which are ushered in by the commencement of menstruation a tendency to chlorosis appears, and the tendency is greater when menstruation does not develop quite normally. The various anomalies of menstruation, especially menorrhagia and dysmenorrhoea which favour the onset of chlorosis belong to gynaecology, and such cases of chlorosis will be prevented by removing these menstrual anomalies. Even normal menstruation during the years of growth may favour an attack of chlorosis, and it is an important duty to secure suitable conditions for young girls during the catamenia with avoidance of all mental and physical over-exertion—very delicate girls require complete rest for several days. There should be an adequate diet and regular evacuation of the bowels. Further details are given in the section on the Prevention of the Diseases of Women. Medical experience shows that the early appearance of puberty favours the development of chlorosis, but we have no definite statistics about this. There are differences in the age at which the catamenia begin which depend upon climate and race: we are not referring to those cases but to the early appearance of the catamenia which depends upon the mode of life. According to Krieger the average age at which menstruation begins is 14·69 years among the higher classes and 16 years among the lower classes of society. "Luxury and good living

tend to cause the early appearance of menstruation, and so too do early over-excitement of the nervous system by theatre-going, late parties and exciting literature."

Menstruation appears earlier in girls who live in town than in country girls whose frugal regular habits of life and hard work delay puberty. The prophylactic measures required to prevent precocity are those so often emphasized by doctors and teachers, namely—Simplicity in the whole mode of life and the preservation of childlike feelings; a regular plan for the day's work; early rising and early going to bed; supervision of her friends and of her reading; hardening the body by cold baths, swimming, gymnastics, games and training in real work. All these are factors which the family physician may use for the prevention of chlorosis in young girls. These measures at the same time tend to prevent the development of habits of masturbation, the prevalence of which among boys and also among girls has often been pointed out, and which not seldom favour the development of anaemia and chlorosis. In many books written on this subject we find the statement repeatedly made but not proved that so-called "boarding schools" to which young girls in the higher ranks of life are generally sent for completion of their education, are often hotbeds for all kinds of pernicious sexual habits; as if these did not occur often among girls not sent to boarding schools.

Marriage has been recommended as a preventive as well as a cure for chlorosis, on the supposition that the complete establishment of the sexual functions counteracts chlorosis. But chlorosis in married women is not rare; we need merely point out that affections of the heart, and a tendency to haemorrhage and nervous diseases often appear as sequelae of chlorosis, in order to understand the great dangers which threaten such a chlorotic woman who has married and has become pregnant. Indeed pregnancy and labour are often important factors in the production of anaemia. It is therefore not right to recommend marriage as a prophylactic or even as a therapeutic measure against chlorosis. On the contrary, as a therapeutic measure we ought rather to discountenance marriage, in order that the

complications of chlorosis may be prevented, especially the affections of the heart and vascular system which pregnancy tends to produce. Consent to marriage should not be given till the chlorosis is completely cured. Similarly marriage as a general prophylactic must not be recommended for delicate weakly girls predisposed to chlorosis, particularly if they have already had chlorosis or if there is a family tendency to it. Early marriage should then be discountenanced, seeing that it brings with it the probability of pregnancy. There are however cases in which the health of the girl is injured and she becomes anaemic and chlorotic—not through any congenital morbid tendency but through an unsuitable mode of life through the want of sufficient active occupation, through many kinds of fashionable follies which are so common among the higher ranks of life. In these cases marriage may be an aid to health, chiefly because these young ladies have then the responsible management of their households with serious duties and regular occupation, and their life becomes wider and is led into quiet and regular ways. We then see many a young woman grow strong who was pale and thin as a girl; others however get only worse. Therefore the mother's question whether her daughter should marry must be answered with great caution and only after considering carefully all the circumstances of the case.

Another disease of the blood which requires special prophylactic treatment is haemophilia, a somewhat rare but extremely dangerous malady. It is not exactly a disease but rather an hereditary constitutional anomaly. It is markedly hereditary and prophylaxis is concerned with the question of marriage with members of such families. According to Immermann's well known researches and statistics it is not necessary to forbid marriage to all the relatives of such families without exception; the following rules are sufficient for guidance—

Firstly: men belonging to families of bleeders and who are themselves bleeders generally beget healthy children who are not bleeders if the mother does not come from a family of bleeders. On the other hand children born of

mothers who are haemophilic are invariably bleeders also.

Secondly: men belonging to a family of bleeders who are not themselves haemophilic will practically never have children who are bleeders if they marry a woman not coming from a family of bleeders.

Thirdly: among the children of women who are not themselves bleeders, but who are descended from families of bleeders, there are almost always children who suffer from well marked haemophilia.

This shows, though we do not know the explanation of it, that in haemophilia the tendency is almost entirely transmitted through the mother, and medical consent to marriage should not be given to any woman descended from a family of bleeders, whether she herself be a bleeder or not. Generally the women themselves are not bleeders. Among 650 cases of developed haemophilia recorded in medical literature, Immermann found that women formed only eight per cent. of the cases and men ninety-two per cent. The male members of families of bleeders may marry without much risk if they are not themselves bleeders; but if they are themselves bleeders Immermann recommends that the history of the family should be inquired into before an opinion is given. If the inquiry shows that haemophilia has repeatedly descended from father to son marriage should not be advised, if on the other hand the tendency to haemophilia appears only on the female side and not at all on the male side, then there is no reason whatever, from a medical point of view, to urge against the marriage of the man who is a bleeder.

When haemophilia is present or there is a probability of its appearance on account of heredity, prophylaxis is concerned with avoiding every possible cause of injury. Grandidier found that the first haemorrhage appeared during the first two years of life in 69·5 per cent. of the cases: children should therefore be specially guarded during the first years of life and shielded from injuries, and later gymnastics must be strictly forbidden. Operative procedures, even the simplest and most trivial ones, should

never be undertaken except when urgently needed. The ritual circumcision of Jewish boys in families of bleeders should be omitted, for Grandidier's statistics show eight cases of death from haemorrhage after circumcision. Immermann considers the operation of vaccination free from danger if very carefully performed. Extraction of teeth is an extremely dangerous operation in bleeders ; Grandidier collected thirteen deaths and forty extremely serious cases of haemorrhage which did not however prove fatal. Unfortunately neuralgia of the dental branches of the trigeminal nerve appears to be very common in bleeders, and they are therefore induced to have their teeth extracted in spite of all warnings.

A means for checking haemorrhage in haemophilia has lately been again brought forward and is worthy of notice. Lanceraux in France recommended the hypodermic injection of a one per cent. gelatine solution to check severe haemorrhages ; the coagulability of the blood is said to be increased thereby and the tendency to formation of thrombi in the bleeding vessels promoted. Favourable accounts have recently been received from different quarters, from French, Russian and German writers, and quite recently from Curschmann, about the effect of these injections of gelatine in various kinds of haemorrhage, especially haematemesis and haemoptysis. Generally 200 grams of a sterile one per cent. solution of gelatine were injected on several consecutive days. Sometimes stronger solutions, ten per cent., were administered by the mouth or by the rectum. Theoretically therefore it might be advisable before undertaking any operation upon a bleeder to inject a solution of gelatine and thus possibly artificially to increase the coagulability of the blood. So far as we know this has not yet been practically attempted but we recommend it as rational in such cases.

In old medical works scurvy and its prevention occupy a large space. Nowadays scurvy among landsmen is so rare that most doctors never see a case. The general improvements in the conditions of life, in the dwellings, in the diet, and in the care of the body have caused the disease

almost to disappear, though formerly it was epidemic in prisons, barracks and infirmaries. Scurvy still often occurs on ships in the arctic regions, sometimes caused by unfavourable climatic conditions, sometimes through the unsuitable nature of the food, for the men are compelled from lack of vegetables and especially of fresh vegetables for long periods to eat chiefly meat, and especially salt meat or dried meat and fish. When it became known that the absence of potassium compounds which we generally get from the plants we eat was an important reason of the unsuitability of such a diet, it was recommended in order to prevent scurvy that sailors should take fresh vegetables, potatoes or fruit so far as possible, or failing this preserved vegetables or certain preserved fruits which keep for a long time, to supply the want of potassium compounds. Lime-juice has since proved especially valuable in this connection.

The Prevention of the Diseases of Metabolism

BY

DR. ROSEN

The Prevention of the Diseases of Metabolism

In earlier times prophylactic treatment in the narrower sense, to maintain normal metabolism of the body, was generally carried out though without any medical prescriptions. The "Spring-cure" was much valued; it consisted chiefly in taking aperients regularly for several weeks in the spring. The object was to expel from the body the effete material which had gathered during the winter and so stimulate the bodily functions to renewed activity. Regular treatment by sweating or by water drinking had the same object, namely to expel impurities by profuse perspirations or copious diuresis. Venesection too was periodically practised and often to such an extent as seriously to injure the patient. These general "cures" are no longer in vogue; a life lived according to the principles of hygiene is a general prophylactic against diseases of metabolism, and only a certain number of individuals need any other special preventive rules. Diseases of metabolism, such as diabetes, gout and the uric acid diathesis, as well as obesity, tend to be inherited. External injurious conditions, accidents, mental influences, diseases and excesses may help to develop the disorders, but these are generally only the exciting cause, while the real cause is to be found in the constitution of the individual and in the peculiar functional tendencies of his cells. In this way the hereditary nature of these disorders is explained, and prophylactic measures

should be commenced early in those whose ancestors have suffered from them. The similarity of these diseases of metabolism is shown by the fact that they may alternate in different generations, and it follows that certain general prophylactic measures are indicated for all who are hereditarily predisposed. Preventive treatment should be adopted early, although the disease does not as a rule appear till later life, and the treatment should aim mainly at influencing the body in order to change the inherited tendency towards abnormal metabolism into normal metabolism. And further these prophylactic measures are indicated in a number of other cases where the individuals are not known to have this hereditary taint but where certain signs point to a predisposition to disease of metabolism. We shall return to this subject later.

In avoiding external injurious factors special stress has been laid upon diet, and certain foods whose metabolism can in such affections be only imperfectly carried out, were altogether excluded from the diet of those who had any tendency to diseases of metabolism.

Apart from the fact that we have now given up special diets in the treatment of diseases of metabolism, there is no reason, judging from the aetiology of these diseases, for thinking that a special diet is called for in diseases of metabolism. For example the influence of carbohydrates upon the development of diabetes seems to be negatived when we consider that the inhabitants of warm climates live principally upon carbohydrates, and yet the cases of diabetes among them are not more numerous than among the inhabitants of colder countries who prefer a meat diet. Some statements have ascribed to diet an influence in the development of diabetes, as for example diabetes is said to be very common in Ceylon (Hirsch); also in Thuringia, in Normandy and in some districts of England where purely agricultural pursuits are followed. On the other hand observations have shown that diabetes is rare in some conspicuously agricultural districts, such as the Antilles and Brazil. Among Jews we find a large number of cases of diabetes, indeed the influence of

race and of heredity is so great in diabetes that Senator maintains, and in this he is probably right, that these errors of diet give rise to diabetes only because great over-loading of the gastro-intestinal canal with purely vegetable food readily leads to gastro-intestinal affections, which then seem sometimes to produce diabetes in those predisposed to it (Griesinger and Zimmer).

The influence of diet has been emphasized in the aetiology of gout even more than in diabetes, especially by English writers (Sydenham, Garrod), who regard the excessive use of meat diet as the chief cause of gout, and therefore in the treatment of gout recommend abstinence from food which contains much nitrogen. Recently we have given up this one sided idea and this treatment of gout; indeed certain physicians even recommend a meat diet for gout. We now know that gout is not a "privilege" of the rich, and that it occurs more often than was formerly assumed among the poor who have never known luxury and the excesses of the table. Nevertheless most clinical observers take the view that good living and excessive eating and drinking, even though they be not the exclusive cause of gout, yet have a certain influence upon gout and especially upon the course it runs by causing an increased formation of uric acid. The present opinion is that this increased formation of uric acid in the body is not the primary and determining factor in gout but rather the secondary.

First there occurs some injury of the tissues, especially at the articular ends of bones, the cause of which is still unknown, and then the uric acid salts crystallize out in these tissues. At all events we should certainly try to limit the excessive formation of uric acid in gout and not allow much nitrogenous food. As a prophylactic, those who seem predisposed to gout should observe a definite regimen. Among those predisposed some have an hereditary tendency to gout, such that they show signs of having a "gouty diathesis"; they are people of luxurious habits and excreting much uric acid. Even more cases belong to the class who have already, perhaps many years before, had a typical attack of gout in the joint of the great toe

and may have been quite free from trouble since. The diet should in general be moderate: meat once a day with the principal meal is sufficient; smoked and salt meat and fish and game should be avoided because the salts and extractives irritate the kidneys. For the same reason strong cheese, spices, asparagus and celery should be forbidden. Spirits, also beer and heavy wines, should not be taken; light moselle wine in small quantities may be allowed, if mixed with some suitable mineral water, such as soda, seltzer, Biliner, Fachinger and Giesshübler.

With regard to the large number of articles of diet recommended or forbidden in gout and in the gouty diathesis we still do not know the reasons and explanations of their therapeutic and prophylactic value. A difference has been made between white and red meat, because white meat contains a smaller proportion of extractives and is therefore said to be preferable in gout; for the same reason boiled meat is better than raw or roast meat. The nuclein of the cell-nuclei appears to supply the material wanted by the organism for the formation of uric acid, and Weintraud has shown that by giving food rich in nuclein, the excretion of uric acid may be doubled in amount or more. The glandular organs which are rich in nuclein—thymus, liver, kidneys and spleen—are therefore forbidden to the gouty; and the same is true of the roe of fish and caviare. Fat was formerly banished from the diet of gouty people, for according to Cantani the oxidation of nitrogenous foods was interfered with by the more readily oxidized fat. Ebstein has again introduced fat into the diet for gout; but he and Pfeiffer on the whole reject carbohydrates, while other writers allow them.

From these contradictory statements and opinions of different writers as to the diet for gout, we gather the general principle that all excess both in the quality and the quantity of food must be avoided and a regular and simple diet adopted; "ordinary homely fare" best fulfils the indications, it guards us from unnecessary limitation in diet and also from eating too much.

The quantity and nature of the food are certainly

factors in the prophylaxis and in the treatment of gout, as well as in the prevention of diabetes and obesity. There is no doubt that occasionally a grave error in diet may cause a gradual or sudden attack of gout; but as it is a constitutional disease, it follows that prophylactic measures must affect parts of the body where metabolism occurs, and improve the activity of those structures if metabolism is to be normal. It is therefore essential to assist the excretion of the products of metabolism by suitable means and thus avoid accumulations. The best means of promoting metabolism is muscular activity. Muscular exercise adapted to each individual case is therefore of paramount value in the prevention of all the diseases of metabolism. The much disputed question of the relation between bodily activity and the formation and output of uric acid, which is answered differently by different writers, is not of any importance so far as gout is concerned. General metabolism is probably always greatly increased by muscular activity: the flow of blood and lymph, and the respiration, are increased, the oxidation processes occurring in the tissues are more thorough, and the removal of effete material from the body is promoted. Useless putting on of fat, to which there is a tendency in those predisposed to gout and to diabetes, is prevented by muscular activity; and it also tends to prevent the various obstructions to the venous circulation so common in these patients; such as haemorrhoids, varicose veins and congestion of the liver. The muscular exercise prescribed for each patient must be according to the functional activity of his muscles and of his heart; those who lead a sedentary mode of life require games and recreation which need only moderate effort, and in which all the muscles of the body are exercised; these are especially swimming, gymnastics, rowing, games at ball. Cycling does not exercise the whole body, and walking does so still less; but these will probably have to suffice in the case of elderly people accustomed to taking things easily, and a few exercises at home, such as dumbbells and Swedish gymnastics might perhaps be added. In addition to increased muscular activity, hydropathic treatment is a valuable means of

promoting metabolism and therefore indicated in the prophylactic treatment of diseases of metabolism. In those predisposed to gout, great care must be taken to avoid cold, because experience has shown that cold may bring on an attack of gout; it is best therefore to commence with daily lukewarm partial bathing and very gradually lead up to washing with cold water, followed by friction. Cold baths, especially sea baths, are not advisable for those who are predisposed to gout, as they make great demands upon the activity of the vascular system and heart. In general those who are inclined to obesity bear cold baths better, and sea baths are often very useful—but on no account should they be prescribed for old people or for those in whom vascular changes exist. The whole body may be rubbed down with cold water, and tepid baths of short duration at about 85° F. may be taken, and the temperature may gradually be reduced even lower. The action of this cold water treatment is reflexly to deepen the respiration and to strengthen and slow the heart's action, and thus improve the circulation; further it acts upon the cutaneous vessels, causing them to contract and afterwards to dilate after drying and rubbing, and thus also it improves the circulation and thereby promotes metabolism. The feeling of well-being which this treatment gives is also of value, and with it comes a natural desire for bodily movement

Very recently some drugs have been introduced as prophylactics in gout, with the idea of preventing the formation of uric acid in the body; for the many attempts to render uric acid soluble by administering lysidin, piperazin, or salts of lithia, and so to remove the tendency to gout gave no good results; as however great was the power of these substances to dissolve uric acid in the test tube, they proved useless when introduced into the human body. Weiss, while recently working in Bunge's laboratory, discovered that quinic acid checks the formation of uric acid in the body; and hippurates which are readily soluble in water are formed instead. Quinic acid is present in lemons and in many other fruits, and this is probably the explanation of the good effects of fruit-cures which have been so

long used for gout. Quinic acid can be combined with various other substances, for instance with piperazin, and this new product called "sidonal" is now being manufactured and can be bought. The results so far seem to give reason for hoping that in sidonal we have really a remedy for gout, and the uric acid diathesis, and also a prophylactic against attacks of gout, as the drug prevents the excessive formation of uric acid and its deposit in the tissues. The dose is 60 to 120 grains daily, and no unpleasant bye-effects have yet been noted. It is recommended that the drug be given for several weeks consecutively.

The preventive treatment of obesity and corpulence requires a few words more. There is not a tendency to corpulence in all people, for in most we find that in spite of all endeavours to put on fat no such increase takes place, and the body maintains a constant balance between intake and output. Prophylactic measures are indicated for all people in whose families obesity is common ; the predisposition to it does not usually appear during the earlier years of life but becomes evident in the middleaged. Nevertheless such people should early begin to carry out the above mentioned prophylactic measures to strengthen their constitutions and to check the hereditary tendency. Sex appears to make no difference. Yet there is a great tendency to obesity among women at the period of the menopause. We do not yet understand the reason for the connection which exists between the menopause and obesity; but there is no doubt about the fact. It appears to be related to certain results brought about by the administration of ovarian extracts as previously recommended by Landau for the ordinary troubles of the climacteric. P. F. Richter and Löwy proved that the metabolic processes in animals after ovariotomy could be considerably influenced by feeding them with ovarian extract: a decided increase in tissue oxidation was found to occur in the animal. These results suggest that it is possible that tabloids of ovarian extract given at the menopause may serve to prevent or to diminish the excessive formation of fat, but we are still without clinical observations on this subject. Thirdly, prophylactic

measures against corpulence are indicated for those who have already in youth shown a strong tendency to obesity, which increases with advancing years. Boys and girls alike show this tendency, and no hereditary taint can as a rule be discovered. In a large number of cases this excessive formation of adipose tissue is accompanied by striking pallor of the skin and weakness of the muscles; in many cases we find also congenital abnormalities of the generative organs, such as retained testes or absence of one or both testicles, and among women defective functional activity of the generative organs especially manifesting itself by sterility.

Finally, a number of cases occur in men, mostly past middle life, of phlegmatic temperament and free from cares, who habitually eat too much and drink too much (generally beer), and become abnormally fat. In these cases prophylactic measures are urgently indicated and a change of living is followed by marked improvement.

Seeing that there are different causes producing obesity, no definite scheme of prophylactic and therapeutic measures can be drawn up to suit all cases; each must be considered by itself. But in all cases it is true that very severe forms of treatment for the removal of obesity are harmful. In the matter especially of diet no general rules can be laid down, but energetic measures in connection with the quantity of food are best adapted for the last class of cases which result from habitual over-eating and drinking. A large number of courses at one meal should be forbidden and a simple diet recommended. The influence of liquids upon the formation of adipose tissue has long attracted the attention of physicians, and the general opinion is that imbibing much liquid promotes the formation of fat. In Schroth's method the quantity of fluid allowed is very small; and Oertel also restricts it considerably. Probably drinking at meals improves the appetite and the digestion. Some restriction of the quantity of fluid taken is therefore generally indicated as a preventive of obesity, especially for heavy eaters. Spirits and beer should be altogether forbidden. A small quantity of a light acid wine may be

permitted at meals. In the choice of a diet the aim is to supply only as much heat-forming food as the body requires, and to prevent anything that would cause fat. Formerly very strict rules were laid down, and certain forms of food were absolutely prohibited. Sometimes only carbohydrates with very little fat were allowed, sometimes no carbohydrates, sometimes only nitrogenous food and carbohydrates. Now that we know that fat may be formed from any one of the three chief forms of food whenever more food material is taken than is required for purposes of combustion, we no longer prescribe any special dietary, but we are able to reach the same end by other means adapted to the individual case. Ebstein's recommendation of giving, in addition to meat and other nitrogenous foods, much fat and little carbohydrate food, is at all events chiefly based upon the fact that fat acts as an aperient; but many people soon get gastro-intestinal disorders from eating much nitrogenous and fatty food, and cannot therefore adopt this treatment. Carbohydrates in any case should be more or less limited, they are readily absorbed and undergo oxidation easily, and thus diminish the oxidation of the fat; they may be much restricted in those who are otherwise strong and healthy and are large eaters. Carbohydrates may also be limited in women at the climacteric, but they should be less restricted in amount in weak anaemic persons, and in those who have a family predisposition to corpulence but are not themselves yet very fat. In these it may even be dangerous to restrict the amount of carbohydrates; a regular diet comprising the three forms of food is required, and the body must be kept free from all disorders of the digestive apparatus — its strength be maintained and increased. A simple regular fare is required with no spirits and no excess of any kind, and the measures previously recommended for improving metabolism are most necessary. In this class of cases we meet with those severe forms of obesity in which there is a progressive deposit of fat and fatty degeneration of organs at the same time, even of the most important, especially the heart.

The fat invades the structures and causes their elements to disappear. These forms of obesity do not depend much upon the nature of the food taken.

The best way of preventing diseases of metabolism would be to prevent marriage between individuals who have or have had these diseases or who are hereditarily predisposed to them. But this is not a reasonable suggestion for general application; moreover heredity does not always appear in the direct line of descent: it makes leaps, and sometimes spares a whole generation, or sometimes a number of individuals in one generation. Moreover we often see how a certain predisposition in one parent is compensated for by the other healthy parent, and a child of sound constitution is born to them. The laws of heredity are still exceedingly obscure, and we do not know enough to enable us to arrive at any definite conclusions yet; but with regard to the severer disorders, diabetes and gout, we may assert that marriage between two who are predisposed to these diseases or have already suffered from either of them should be avoided. Further we know that diabetes and gout have certain aetiological relations to mental and nervous disorders, so that in some families all these varieties of disease are met with. As a prophylaxis marriage should therefore be avoided between persons in whom there is on both sides a predisposition to these constitutional diseases, especially to diabetes and gout.

The Prevention of Infectious Diseases

BY

DR. RICHARD ROSEN

This article has been slightly modified with the view of rendering it more applicable to the English reader.

The Prevention of Infectious Diseases

From what was said before concerning infectious diseases, it follows that the principles which guide us in their prophylactic treatment are similar to those in the case of other diseases; but in addition we need to guard against the external injurious influences, the pathogenic bacteria. It is essential also to employ means to raise the powers of resistance of the individual and to assist the constitution in its battle against the injurious influence. But in infective diseases, the external injurious factor—infection by the invasion of the body by special bacteria—is probably a more prominent factor than the constitutional one, and our prophylaxis is essentially a battle against infection. The best protection against infection would be the destruction of the infective material. This is the work really of public hygiene, and it endeavours to remove by sanitation the conditions necessary for the growth of the germ; by the removal of refuse, filtration of drinking water, and similar measures which aim at keeping the bacteria and their toxins from coming into contact with human beings. And indeed such precautions taken by the State and by district authorities have succeeded in almost entirely stamping out certain infective diseases, the infective agents and the mode of infection of which are known. For example, when it was recognized that specifically infected drinking water was the most frequent cause of epidemics of typhoid fever, some towns provided a supply of pure water, and such epidemics ceased almost entirely.

Individual prophylactic measures have for their object the protection of the individual himself against infection. The methods depend upon the manner in which the various infective diseases are conveyed, and will differ according as the infection is conveyed by the air, as in smallpox, or chiefly by the evacuations, as in cholera. For purposes of prophylaxis, infectious diseases may be grouped into those the germs of which are carried by the air and those in which the germs are conveyed by some solid or liquid, whether the diseased body itself or some of its excretions or secretions. Though all infective diseases do not fit at all accurately into this scheme, yet we can on this principle arrange them provisionally somewhat as follows, the channels given being the main, but not the only, media of infection—

A. Infection is conveyed in

Measles Scarlatina Smallpox Chickenpox Typhus fever Whooping cough Influenza	mainly by the air, and by the secretions given off by the invaded membranes or organs.
Epidemic pneumonia Mumps Diphtheria Cerebro-spinal fever Pneumonic plague Internal anthrax	

B.

Enteric fever Cholera Dysentery Communicable diarrhoea	by the excreta, and by articles, foods, and drinks infected thereby.

C.

Glanders Syphilis Gonorrhoea Contagious ophthalmia Puerperal fever Tetanus Erysipelas External anthrax Bubonic plague	mainly by inoculation with the infected secretions, but certain of these diseases may be, at times, air-borne.

D.

Malaria Yellow fever Filariasis	by the bites of mosquitoes, acting as the intermediate host of the specific parasite.

Protection against infection must be according to the method or methods in which the infection is conveyed: in diseases of the first group A, in which infection is through the air from man to man, infection may also occur as in group B or C by means of soiled linen used by the patient; the secretions from the mouth and nose also of these patients are infective. Therefore in all infective diseases, almost without exception, utensils should be set apart for the patient alone and not be taken into general use, and all soiled linen, rags or utensils should be burned or disinfected. All who are brought into contact with infectious disease should carefully wash their hands and cleanse their nails before meals, and should avoid touching their mouths with their fingers; in the sickroom the attendants should wear linen overalls over their ordinary clothes.

For diseases where the infection is conveyed through the air, the safest mode of prevention is the isolation of the patient, although theoretically perfect isolation cannot be carried out, as the attendants themselves are liable to carry infection without themselves being ill. In small houses, where it is impracticable to afford one or two rooms for the sole use of the patient and his attendant, it is desirable that the patient should be removed to an isolation hospital,

and the room and infected articles thoroughly disinfected by the sanitary authority. But where there is no such hospital accommodation a room as far removed from the rest of the household as possible should be set aside for the use of the patient, and an attendant, preferably one who has already suffered from the disease, or is likely to be relatively insusceptible to it, should be told off to take charge of him. In scarlatina the desquamated cuticle is still regarded as one of the means of conveying infection, but infection is also situated in the secretions from the nasal and aural passages in cases where the patient suffers from rhinorhoea or otorrhoea.

When the infective material is air-borne and reaches the patient directly by the air, it is difficult to ensure absolute protection against it from isolation of the patient. For example, in epidemics of influenza we must assume that the germ of influenza is, if not ubiquitous, at least very generally diffused. Much, however, may be done by preventing the gathering together of large bodies of persons and by the isolation of those affected with the disease.

The infection of erysipelas is perhaps liable to be spread directly by the air, but conveyance of the infection from person to person by direct contact or close proximity is probably more frequent. Just as in hospitals, strict isolation of erysipelas cases is enforced, so also in private practice the patient should be isolated; very strict and thorough methods of disinfection are essential, and bandages and dressings should be burnt directly after removal.

In infective diseases where the infectious material is not carried by the air there is no danger from proximity to the patient. If infection is situated only in the affected part of the body, for example in gonorrhoea and in syphilis, prophylaxis is merely required to prevent direct contact of a healthy body with the affected part, or the discharges therefrom. For infective diseases which are conveyed to man from animals, such as hydrophobia, glanders and anthrax, prophylactic measures should include the destruction of the diseased animals, and also public regulations for the preservation of health, such as the compulsory muzzling of dogs and other suitable precautions.

When the germs of the disease are conveyed chiefly through the evacuations of the patient the prophylactic measures are obvious. Among these diseases are typhoid fever, dysentery and cholera, where the evacuations from the bowels contain and spread the infection, as also may the vomited matter in cholera. Another member of this class is diphtheria, in which the poison is contained in the secretions of the mouth and nose; and to some extent also pulmonary tuberculosis may be considered as belonging to this group, for this disease is mainly spread by the sputum of the patient.

In the case of typhoid fever, cholera or dysentery, or in conditions in which one or other of these diseases is suspected, the excreta (in typhoid fever including the urine) should be received into a vessel containing a small amount of some efficient disinfectant, such as carbolic acid (5 per cent.) or acidulated perchloride of mercury (1 in 1000). After the motion has been passed, more of the disinfectant solution should be added, the whole being intimately mixed together and allowed to stand for some thirty minutes. Care should be taken that sufficient disinfectant is added to prevent the percentage strength of the mixture being reduced below its limit of efficiency by dilution with the excreta. The contents of the bed-pan, or other receptacle, may, after disinfection, be emptied down the slop-sink or water-closet where there is a proper system of sewers; but in rural districts where drains or sewers do not obtain, the excreta may be buried in shallow holes dug in the ground sufficiently remote from wells or other sources of water supply. It must be borne in mind that the disinfectant itself, altogether apart from the specific virus of the disease, may seriously endanger the purity of a water supply. The soiled bed and body linen should at once be soaked in a vessel of soap and water, and the articles be subsequently raised to the boiling point during the washing process. Soiled articles of bedding such as mattresses and blankets which cannot be thus treated should either be handed over to the sanitary authority for disinfection in a steam apparatus or be destroyed by fire. In these three diseases, namely typhoid

fever, dysentery and cholera, the physician may generally prevent any further extension of the disease by giving exact rules to be followed by all the members of the household. "When cholera is prevalent the family physician, as the friend of the household, can guard the inmates in a way scarcely possible at other times" (Lebert). These indications of the way in which individuals may be protected against direct infection will suffice here. Much the same is true of diphtheria, but in that disease the linen and the plates and drinking vessels require special disinfection, while the excreta do not. Healthy people must be specially warned against coming near the patient's face when he coughs.

In tuberculosis, too, infection may be conveyed by coughing, small droplets of fluid carrying tubercle bacilli being cast into the are, and inspired by healthy persons. Flügge has recently drawn special attention to this mode of infection, which he considers far more dangerous than that by dried sputum or dust. As a result of Flügge's work, B. Fränkel has introduced a mask which is somewhat similar in form to Schimmelbusch's chloroform mask, is covered with two layers of thick muslin, and fastened around the ears or the head by an elastic band. The mask covers only the mouth and leaves the nose free. The material can be easily removed and replaced by a new piece. It is proposed that this mask should be worn by patients who expectorate much and have advanced phthisis, because apart from the act of expectoration, the small drops of fluid containing tubercle bacilli which are often thrown out in speaking, coughing, and in clearing the throat, would be stopped by the mask. Flügge's and B. Fränkel's experiments seem to show that patients with early phthisis do not convey infection in this way.

Nevertheless all phthisical patients should be reminded by the physician to hold the hand before the mouth when coughing, and so far as possible to suppress coughing in the presence of others. A little practice will enable the patient to do this.

Other ways in which tuberculous infection is conveyed,

and the prevention of infection, will be described later in connection with the prophylaxis of tuberculosis.

While prophylactic measures are being taken against the agents which cause infection and are mainly applicable to the bodies of those who are already affected, other precautions should at the same time be taken to strengthen against disease the bodies of those who are healthy, making them as it were proof against infection and removing or reducing the predisposition to disease. On the other hand the healthy body must be guarded from everything which would call forth or increase predisposition to the disease. Prophylactic measures such as these for the healthy body are of especial value in cases where it is not possible to do much or, indeed, anything against the infective agents, especially when they are conveyed through the air.

The object of prophylactic treatment in this connection is twofold: to prevent the poison from entering the body by the ordinary channels and to keep these channels in normal conditions. The healthy mucous membrane is able to resist many injurious influences and often even pathogenic bacteria. During cholera epidemics numbers of cholera bacilli are said to have been found in the evacuations of healthy people. Pettenkofer and others swallowed cultures of cholera bacilli and were not attacked, the normal stomach and intestines were able to prevent the bacteria from getting into the tissues. The conditions of the mucous membrane which permit the entry of bacteria into the organism may be temporary or permanent, and may be the result of some anatomical lesion or of some functional change. To take cholera as an example, experience has taught us that gastric and intestinal catarrh favour the development of cholera, for the diseased mucous membrane cannot withstand the infective agents. In times of cholera all errors of diet should be avoided and forms of food likely to start diarrhoea, such as cucumbers, melons, and unripe fruits and acid beverages. Taking cold, overexertion, and mental emotions also readily exert a bad influence upon the functions of the stomach and intestines, and a regular quiet life with moderation and care in every

respect is therefore to be recommended. But the ordinary way of living should on no account be altered if it is normal and sensible. Not only do such injurious influences which are accidental and temporary act upon the gastro-intestinal canal and predispose to the disease, but permanent abnormal conditions act similarly; for persons with "weak" stomachs or with well marked affections of the stomach or intestines are very apt to sicken with cholera. At such times weak and delicate people should be recommended to have a diet adapted to their individual needs, and to take wine, and small quantities of rum or brandy in their tea, keeping the feet and the body warm. Every disorder, even those apparently trivial, especially when affecting the stomach and intestines, should receive careful treatment.

Similar precautions are required in epidemics of typhoid fever and dysentery; here as in cholera infection enters by way of the digestive tract. In sporadic cases of typhoid fever early and thorough disinfection, together with the other rules given above for destroying the infective material, will suffice.

Accidental lesions of the skin or mucous membrane which permit of the entry of infection are often so trivial as to be easily overlooked. In erysipelas of the face the disease starts at some minute excoriation of the skin especially at the nostril, so common in an ordinary nasal catarrh. Special care should be taken when a patient who has once had erysipelas gets a nasal catarrh, because erysipelas belongs to those diseases which leave a predisposition to a second attack. The nasal catarrh should be carefully treated, the nose smeared with boro-vaseline, and the fingers should not be allowed to touch the face.

To keep the respiratory organs intact is of great importance in influenza. The different forms in which influenza manifests itself and the appearance of local affections in addition to the general symptoms may indicate that the germs of influenza can enter the body by different channels. It is remarkable that in different cases of influenza sometimes the digestive tract is almost exclusively affected, sometimes the respiratory system, sometimes the

nervous system. The method of infection in influenza is still obscure, but many observations seem to point to infection through the respiratory tract. It has been shown that those are specially apt to get influenza who have also a predisposition to colds, to bronchitis and laryngitis, and those who have some acute or chronic disease of the upper respiratory passages. The influenza germs which may be in the air we breathe readily attack an epithelial surface already pathologically changed and thence more easily pass into the lymph stream. This is in accordance also with Breitung's statement that those children are particularly liable to be attacked by influenza whose nasal respiration is hindered by swelling of the turbinates or by adenoid growths. The tonsils are regarded as a locality where influenza may begin, and slitting the lacunae has been recommended as a prophylactic. Recently in the Académie de Médecine at Paris the subject of protection of the individual against influenza was discussed. As a preventive during epidemics of influenza, Huchard recommended disinfection of the nose and mouth with antiseptic solutions; Labonde recommended washing out the nose and throat twice daily with a weak hot solution of carbolic acid (1 in 3,000); Huchard considered that it was also necessary to make the digestive tract aseptic, and to this end a milk diet is best; the usual drugs employed for this purpose, such as naphthol and salol, are less useful. Breitung regards the inhalation of nascent chloride of ammonium from a special apparatus an effectual protection against influenza; those whose profession causes any special strain upon the organs of respiration—as teachers, preachers and singers—and who are thereby probably predisposed to influenza should guard against it by regularly inhaling ammonium chloride.

Not only in influenza but also in other infective diseases the tonsils are supposed to serve as a place for the entrance of the infection. The exciting agents which cause measles and scarlet fever, often seem to gain entrance through tonsillar leisons, and so too does the diphtheria bacillus. Affections of the tonsils whether acute or chronic always require most careful treatment; often

there are on the tonsils deep pockets and channels which gradually get filled with plugs consisting of particles of food and of cellular debris which are undergoing decomposition, smell badly and keep up a chronic irritation of the tonsil. These pockets must be slit up and the plugs removed. The further treatment is that for chronic inflammation of the tonsil—painting with solutions of alum or silver nitrate, or removal of the tonsil by the guillotine.

Having considered the predisposition of individuals to infection through the condition of their mucous membranes, we have now to consider another kind of predisposition which is in a sense less definable as it depends upon the general constitution. A kind of general weakness in many cases is the basis upon which this predisposition rests; it is very clearly marked in pulmonary tuberculosis in which a definite inherited constitution predisposes to the disease. Sometimes predisposition to infective diseases is the result of a weakness of the body which does not show itself by any outward signs and is not inherited; this weakness is rather an accidental acquired weakness which may attack even robust natures. For example we know that lobar pneumonia often results from a plunge into cold water or some other excessive chilling of the body; and so too does articular rheumatism. This sudden cooling causes a momentary weakness which makes the body susceptible to infection. In epidemics it has often been observed that people fall victims to the infection directly after some severe over-exertion, after some form of excess, especially venereal excesses or any condition which has weakened the whole body. It follows that during epidemics prophylaxis consists in avoiding all that would in any degree reduce the functional activity of the body.

In epidemics we see one sicken with smallpox or scarlet fever, while another—perhaps a brother—remains well; yet the conditions under which they lived and their mode of life were exactly the same, and neither showed any signs of ill health or difference in bodily condition. Probably there existed some very minute chemical differences in the blood and lymph which made the one susceptible to the action of

the infective material. Into this obscure region of aetiology a ray of light has recently been flashed by the work of Ehrlich, Brieger, Behring and others who have shown that in the blood certain chemical bodies (alexins) act under special conditions as antidotes to certain bacterial poisons; these alexins are derived principally from cells, mostly the white corpuscles of the blood. These recent aetiological researches were suggested by the great practical results which followed the use of inoculation as a therapeutic and prophylactic measure; the substances used for inoculation stand in a definite relation to the infective bacteria or to their products, and when injected into the body render it immune against the infective poison. In this way we imitate nature's method of making the body immune; this immunity against certain infections is inherited by some, by others it is acquired—sometimes because they have already had that particular disease, as in smallpox, measles, scarlet fever, or typhoid. In other cases a person who has once had an infective disease is more predisposed to it and liable to have it again, as in articular rheumatism, erysipelas, influenza and diphtheria. Sometimes increased predisposition to an illness is left as the result of some other illness, for instance measles predisposes to tuberculosis; scarlet fever and also measles predispose to diphtheria; measles moreover predisposes to whooping cough.

The theory of preventive inoculation cannot be entered into more fully here. Until a few years ago inoculation was undertaken only against smallpox, but of late years Pasteur, Behring and others have inaugurated a new era by preventive and curative inoculations for other infective diseases. The great practical results which have followed from vaccination against smallpox have very frequently been quoted. Vaccination, where properly applied, has brought about almost the extinction of a disease which in the eighteenth century and in the beginning of the nineteenth century was one of the commonest and most dreaded of diseases. Cases of smallpox which occur now and again have always been traced to infection brought from abroad, especially from Russia, where compulsory protective inoculation

against smallpox (vaccination and revaccination) has not yet been introduced. Among the most ancient civilized races—the Chinese and the Indians—there was practised in prehistoric times a method by which an attenuated form of the poison of smallpox was employed in order to produce a mild form of "sporadic" smallpox, by which the body was rendered immune against the disease. This method of inoculation of smallpox (variolization) was introduced into Europe in the eighteenth century, but was subsequently forbidden by law because of the danger of the spread of smallpox by its employment. In 1796 Jenner introduced the valuable method of vaccination, the inoculation of human beings with the infection of cowpox, and it has since been scientifically and experimentally proved to be an effectual protection against true smallpox. It is now many years since vaccination became recognized as a branch of public hygiene. For individual prophylaxis it is advisable that everyone should be revaccinated before going into countries where there is smallpox, because after the lapse of a certain period vaccination no longer affords absolute protection against smallpox, although the disease runs a milder course in one who has been vaccinated. Sometimes, for example in India, we are told it is possible for white men who have travelled thither to be susceptible to vaccination on their arrival, though attempts to vaccinate them failed shortly before they started from home.

The modern endeavours by bacteriologists to discover methods of protective inoculation against other infective diseases by strictly scientific methods have not yet led to great practical results, though a beginning has been made which augurs well for the future. The value of Pasteur's inoculations against hydrophobia are universally acknowledged; the method has been successful in the treatment of several thousands of people bitten by animals apparently suffering from rabies. The principle upon which this treatment by inoculation is based is to make the body immune against the infection by giving gradually increasing doses of the specific antitoxin. For this purpose Pasteur used the spinal cords of rabbits infected with the poison of rabies; the cord was exposed to a drying process and dried

for different periods to produce virus of different degrees of virulence: the driest is the least potent. Emulsions of these different spinal cords were then injected at regular intervals into the human body. In Berlin a special part of the Institute for Infectious Diseases is now reserved for inoculation against hydrophobia, and any one in Germany who has been bitten by an animal which has or is suspected of having rabies is sent to the institute without delay for treatment. The value of Pasteur's protective inoculations against anthrax has not yet been fully recognized. Anthrax occurs very seldom in human beings and the method is used mostly for animals, but in spite of the incontrovertible results obtained in the laboratory the method has not yet been introduced into veterinary practice.

Behring's serum treatment of diphtheria is recognized by all to be most valuable and successful, but the proposed preventive inoculation against diphtheria has not as yet been generally applied. It is based upon the same principle as curative inoculation, but the serum contains a smaller number of units of the virus; in children 250 units are generally injected. The injected serum gives immunity for three weeks, and the inoculations should be repeated every three weeks. Further details about this subject will be found in the section on Diseases of Children. Preventive inoculation against diphtheria is rarely required for adults.

Quinine, the specific drug for malaria, is also highly valued by authorities on malaria as a prophylactic against this disease. Hertz recommended 5 grains of quinine every morning and evening during epidemics in malarial districts, and obtained very good results—sometimes no attacks at all occurred, sometimes the attacks were of an extremely mild type. After using the drug for some time the organism gets habituated to it and the drug loses some of its efficacy, and should therefore be discontinued for two or three weeks every now and again. For the ordinary endemic attacks of malaria a longer use of the drug is not of value in prophylaxis, but it is sufficient directly the first symptoms of malaise appear to give 10 grains of quinine in the evening at bedtime for three or four consecutive days, in order to cut short the attack.

The Prevention of Pulmonary Tuberculosis

The great frequency of pulmonary tuberculosis and the great mortality caused by it justify us in devoting a section specially to the prevention of this most serious of all infective diseases. There are even now those who deny the infectious nature of tuberculosis and look upon the disease as one purely constitutional. Although the constitution is an important aetiological factor in tuberculosis, yet clinical observation and experimental research both point to the tubercle bacillus as the exciting cause of tuberculosis. The instincts of the people, which are particularly acute in such matters, long ago convinced them that pulmonary consumption is communicable. The whole of our knowledge points strongly to the conclusion that prophylaxis must concern itself with preventing the tubercle bacillus from entering the human body. We must endeavour to render innocuous the excretions and evacuations of the patient which contain the bacilli. The sputum is by far the most important vehicle for the conveyance of tubercle bacilli outside the body, and the other excretions are comparatively unimportant; moreover, the bacilli contained in the urine and faeces are very quickly destroyed by putrefaction. It is known, too, that even the bacilli in the sputum may already have lost their virulence (Koch and Kitasato), but this is not always the case, and it has been shown that while one portion of a sputum did not infect animals by the bacilli which it contained, another portion of the same sputum contained

numerous virulent bacilli (Cornet). The sputum of the patient should therefore be made innocuous. Since the State and the district authorities have turned their attention to this branch of prophylaxis a noticeable diminution of tuberculosis has been recorded in Germany. Before the year 1889 the mortality caused by tuberculosis in Prussia was thirty to thirty-two per 10,000 of the population, now it is only twenty-one to twenty-two per 10,000 (Cornet). In hospitals and in sanatoria where there is adequate supervision it is easy to see that the sputum is not expectorated on to the ground or into the handkerchief but into sputum cups. In private practice it can only be done if the physician ceaselessly instructs his patients about the matter; bedridden patients should have simple sputum glasses or cups, into which a little water with or without some disinfectant has been previously poured. Plain water answers the purpose, for all we need to do is to prevent the sputum from becoming dry and from being scattered as dust through the air to be breathed by other human beings. Phthisical patients who still get about should carry a pocket sputum flask; Dettweiler's flask is most generally used. Unfortunately patients often fail to use such flasks because they dislike attracting attention to themselves and being recognized everywhere as consumptives by their use of a flask, and this is only natural from the human standpoint. To do away with this difficulty the use of flasks should be made general for all people who have any expectoration, not only for consumptives but also for all who suffer from bronchitis, asthma, or disease of the throat or larynx. The sputum flask would then not be the sign of a consumptive, but merely an indication of a conventional custom which dictates that well bred people expectorate into a flask instead of into a room, a carriage or other similar place. These flasks can then be emptied down the closet, care being taken that none is splashed about, or into special holes dug in the ground. The patient should also be urged not to cough or to sneeze into the air of the room, but to hold a cloth or a hand before his mouth and nose when cough-

ing or sneezing. Every physician knows by experience that many patients will cough towards him without the least concern while he is engaged in examining them: constant instruction will correct such carelessness on the part of the patient. Recent methods introduced to prevent the saliva from being scattered into the air when the patient speaks have already been described; we have not yet any definite knowledge whether germs can thus be scattered so as to cause infection, at present there are those who hold Cornet's view about this, while others hold Flügge's, and it is best therefore for the present to do justice to both views by suitable prophylactic measures. Recently too a disposition has been shown more than hitherto to remove patients with advanced consumption from their families; their copious expectoration which swarms with bacteria is a very great danger as a source of infection for those around them. Patients in the early stage of consumption often have no bacilli in their expectoration or very few compared with the enormous number present during the stage when there are cavities. If the home circumstances do not permit of the patient being properly and adequately nursed, every effort should be made to get him into a hospital during the later stages of the disease. Unfortunately there are not yet sufficient hospitals for these advanced cases.

The prophylactic measures above mentioned for making the sputum innocuous are those to be observed by the patient, but the healthy should on their part also observe precautions to protect themselves against infection. Adequate prophylactic measures are required from childhood onwards. Scrofulosis which nowadays we look upon as also caused by tubercle bacilli and which often is the forerunner of other forms of tuberculosis, is sometimes caused in childhood simply by want of cleanliness. Volland has drawn attention to this fact: small children come into close contact with the ground in their games and when they learn to walk, and with the dust on the floor. They afterwards touch the apertures of the body and scratches and wounds with their dirty fingers, and thus readily convey

the tubercle bacillus and other germs into their body. The need for cleanliness of the child's hands, fingernails and face should be impressed upon mothers and nurses. The nursery floor should be wiped over once or twice a day, and the toys should be kept clean. Very special care in this matter must be observed when there is a phthisical member in the family who has some expectoration. Further those around the patient should avoid any unnecessary close contact, especially kissing and sleeping together. But the fear of infection should not be carried to an extreme so as to wound unnecessarily the patient's feelings. On the contrary those who are afraid should particularly be told that merely to be in the vicinity of the patient is not harmful and that his breath is free from danger; but the spoon and fork he has used in eating should not be used by another till they have been washed. With regard to the room, special stress must be laid upon the ordinary rules of hygiene, such as ventilation, wiping the floor with a damp cloth, and the avoidance of dust.

After the death of a consumptive patient at home, the linen, bedding and clothes should be thoroughly disinfected; the walls of the sick room should be freshly painted or papered, or the old paper should be cleaned with bread. Until the sanitary authorities undertake the disinfection in cases of tuberculosis every doctor should, in the interests of the survivors, direct the disinfecting of the rooms. Opinions differ as to whether it is advisable to introduce compulsory notification of tuberculosis, but all are probably agreed that after a case of death from tuberculosis disinfection should be obligatory.

To prevent tuberculous infection being conveyed from animals to man, especially by meat and milk, a well organized body of sanitary inspectors is needed, and since the tuberculin test is now extensively used by veterinary surgeons for purposes of diagnosis, it is possible to remove tuberculous cattle from the rest and thus gradually stamp out the tuberculosis among cattle which is now so prevalent. Since the introduction in Germany of the compulsory inspection of meat in slaughter houses,

private precautionary measures against infection through meat are not generally required; on the other hand milk should be boiled or sterilized before being used unless there is an absolute guarantee that the cows are sound in health. Recently market butter was strongly suspected of being the conveyer of virulent tubercle bacilli (Obermüller), but examinations made (Rabinovitsch) gave reassuring results, and proved that the bacilli were perfectly harmless ones, very similar to tubercle bacilli for which they had been mistaken. It would therefore seem that in eating butter and cheese we need not fear infection by tubercle bacilli.

The prevention of scrofulosis in children was stated above to be a valuable prophylactic against the occurrence of other forms of tuberculosis in adult life. The signs of scrofula may all have disappeared, except possibly some slight swelling of the cervical glands, and the individual may apparently be in good health for years till, when he is over twenty, signs of apical disease of the lungs appear. The opinion held by most authorities is that virulent tubercle bacilli may be lodged and encapsuled in the different parts of the body, most often in the lymphatic glands, and that even after many years some exciting cause may take them into the lymph stream and set up tuberculous disease of some organ. The cervical, bronchial and mesenteric glands are those most often affected; and in children the lymphatic glands of the neck are by far the most common seat of scrofula. And further, tuberculous disease of a joint or bone, tuberculous affections of the genito-urinary organs, of the skin or mucous membranes, may after an apparently perfect cure and complete functional recovery give rise years afterwards to a fresh development of tuberculosis, especially of the lungs. Tuberculosis is apt to leave small caseous foci which contain germs still capable of life (Gerhardt); these foci are encapsuled by scar tissue and are thereby made harmless till some external cause, some injury, breaks as it were the capsule and causes the latent germs to become active again. As a prophylactic measure

against tuberculosis in the adult, it is necessary therefore that scrofula in childhood should be perfectly cured. Whenever possible tuberculous foci should be completely removed from the body by operation; caseous lymphatic glands must be carefully and completely excised, caries of bones must be thoroughly cured by prolonged treatment with iodoform. Not rarely we see children, and even adults, going about with suppurating fistulous openings connected with different bones, with caries of the petrous bone and of the auditory ossicles, and yet these children have not for a long time been under medical treatment. In connexion with this subject, Penzoldt has recently shown how important it is in the treatment of pulmonary tuberculosis to inquire carefully in every case for external manifestations of tubercle and to cure these first. The gums and tonsils and the mucous membrane of the nose and throat are now regarded as very important localities for the development of tuberculosis of the lungs. Primary tuberculosis occurs in these places much more often than was formerly believed, and thence infection of the lungs often follows. This opinion is however not held by all authorities: thus Moritz Schmidt considers that these affections of the nose and throat are secondary to pulmonary tuberculosis, and only very rarely primary.

The knowledge of the frequent connexion between pulmonary tuberculosis and earlier tuberculous affections of lymphatic glands, bones and other organs, should make us, so far as prophylaxis is concerned, regard all who have had such affections in youth as predisposed to tuberculosis, and they should take as much care to guard against a fresh infection as those who are especially predisposed to pulmonary tuberculosis. It is therefore necessary in prophylactic treatment to classify more carefully the individuals who, according to medical experience, have this predisposition to pulmonary tuberculosis. There are first of all those who are hereditarily tainted. Modern bacteriologists deny that this hereditary predisposition has any important influence upon the development of pulmonary tuberculosis; but the experience of centuries proves the powerful

influence which heredity has upon the development of tuberculous disease. But the opinion formerly held that tuberculous infection may be directly inherited is not correct: infection of the child by germs in the spermatozoa or ovum does not occur. Direct placental infection of the child when the mother has tubercular disease of the generative organs is possible, but is so extremely rare that we need not consider it. The predisposition alone is inherited; this consists not only in the configuration of the thorax but also in the degree of functional activity of the organs, which seems to us to be generally independent of their anatomical structure, and in the entire conformation of the body which makes it a suitable nidus for the bacilli. By whatever words we express this kind of predisposition, it remains true that we do not perfectly understand the nature of hereditary predisposition and cannot yet refer it to any obvious lesion. The term "general weakness" has been used to designate it, but if by this we mean general weakness of the muscular system and decrease of the functional activity of the body, then the term does not cover all cases of hereditary predisposition, because some individuals who are muscularly strong and active also become affected with tuberculosis. A large number of individuals who are predisposed to tuberculosis have the so-called "phthisical constitution," that is the body is obviously of slight muscular power; but this phthisical constitution may be present though no case of tuberculosis has occurred in the family. The chest is long narrow and flat, the intercostal spaces are wide and deep, the neck is long and thin; the muscles are mostly poorly developed, especially those of the chest and back, so that the shoulder blades often stand out like wings and the ribs and clavicles are very clearly seen. Formerly much stress was laid upon the estimation of the "vital capacity" of the lungs, and it was thought that the respiratory capacity in individuals with a phthisical constitution was so greatly reduced as to be an important aid to diagnosis. These measurements have not proved to be of much value in practice. These individuals are also of pale colour, the lips and the con-

junctivæ are only slightly red, they are light in weight, and have little power of resistance against bad weather and over-exertion.

A predisposition to tuberculosis is also left by several other diseases, not it would seem because of any special weakness left by the disease, otherwise all weakening diseases would leave such predisposition ; but rather we must assume because the constitution of the lymph and of the blood after these illnesses favours the implantation of the tubercle bacillus. In children pulmonary tuberculosis often follows measles and also whooping cough ; so during and after these illnesses special care must be taken to guard such children against infection by the precautionary measures enumerated above, and above all by cleanliness of their hands, faces and surroundings. Syphilis in children and in adults increases the predisposition to tuberculosis, so too possibly does influenza; and according to Jürgensen, also catarrhal pneumonia. After catarrhal pneumonia it is most essential to develop the respiratory muscles and to order a long stay in the country. Those suffering from diabetes are specially prone to develop tuberculosis. Just as colonies of tubercle bacilli flourish more luxuriantly in a nutritive medium containing sugar, so too the growth of the bacilli in the human body seems to be favoured by an increased amount of sugar in the lymph and blood ; one fourth of those who suffer from diabetes are said to die of phthisis (G. Sée).

In another way certain other affections may also increase the predisposition to tuberculosis by reducing the power of resistance of the epithelium, for instance abrasions afford a passage for the infection. To this category belong the catarrhs of the upper respiratory passages, especially chronic bronchitis and pharyngitis and laryngitis. Also inability to breathe through the nose by reason of swollen turbinates or adenoid vegetations, so that the air fails to be filtered by passing through the nose. And further certain occupations predispose to tuberculosis because the inhalation of sharp particles causes lesions in the bronchial mucous membrane ; for example the occupation of workers in stone, glass

grinders and file cutters. Infection will then readily occur through intercourse with phthisical patients or through a prolonged stay in crowded rooms where phthisical patients have expectorated.

All individuals belonging to these classes with a special predisposition to pulmonary tuberculosis need regular and thorough preventive treatment as a prophylaxis against infection as detailed above. But they must also be guarded against all injurious influences which tend to lower the resisting power of the body. The patient often tells the physician that the illness began after a cold, after some over-exertion, or after some accident. Medical observation has shown that such accidental causes not rarely determine the outbreak of tuberculosis, especially when predisposition to it is present. Among these accidental causes are colds, injuries, physical and mental over-exertion, mental depression, alcoholic and venereal excesses. The tendency to taking cold must be combated by regular methodical treatment which hardens the body, and the individual's occupation and mode of life should be so far as possible such as to prevent exposing the body and mind to great changes of condition. Every kind of excess must be absolutely forbidden to such patients; no alcohol should be allowed except a little beer or wine, no tobacco, and moderation in sexual intercourse should be enjoined. Measures should be adopted to improve the general condition of the body and thus at the same time reduce the predisposition to the disease. Great care is required in the matter of diet: thin and weak individuals should have good and appropriate food to increase their body weight; they should have fresh air in their rooms and be much out in the open air. Breathing exercises should be regularly practised out of doors—deep inspiration and expiration with intervals, the chest being free. Moderate exercise also, according to the state of each individual, should be taken, and possibly moderate exercise on horseback. In bad weather the exercises should be performed indoors with open windows.

If it is conceded that tuberculosis generally attacks the apex of the lung because the respiration and the circulation

are less vigorous at the apex than in the rest of the lung, then it is important in prophylactic treatment to see that the apices of the lungs are well ventilated by deep inspiration while the shoulders are kept low. So often one sees young people during their growth in a faulty attitude, with the head and neck bent forward and the shoulders high; this position interferes more or less with respiration at the apices of the lungs, and special attention should therefore be given to the attitude. The preventive measures with regard to the care of the body and mind are similar to those required in the treatment of tuberculosis.

Authorities rightly insist upon the necessity of preventive treatment of tuberculosis, and the physician ought not to wait until he discovers an impaired note at the apex of the lung, or hears râles, or till the discovery of tubercle bacilli with the microscope makes the suspected diagnosis of tuberculosis a certainty, before he begins to treat the patient hygienically and dietetically. Hygiene and diet are nowhere so important as in these pale thin youths and young girls with shallow respiration, whose poor appetite and small amount of strength are a constant source of anxiety to their friends, especially when there is consumption in the family. These individuals must not be sent away by the physician, the anxious parents merely being told that there is nothing absolutely wrong with the lungs and that there is no need for anxiety. Although the lungs are not yet attacked, the friends should be urged to do everything possible to strengthen the weak body and make it more capable of resisting disease. The public fully understand and appreciate the endeavours of the physician to guard against the disease. The prophylaxis of tuberculosis is closely related to early diagnosis, and early diagnosis is included in prophylaxis. We are not now referring to symptoms of catarrh at the apices, haemoptysis, progressive loss of flesh, night sweats, fever, which even when no bacilli are found in the sputum often suffice for the diagnosis; we are referring rather to other symptoms which make us suspect commencing phthisis though there is no evident disease at the apices and which should cause us to prescribe prophy-

lactic, hygienic and dietetic treatment. These symptoms are general ones and do not specially point to any local disease of the lungs. Thus in commencing phthisis, long before any certain signs of the disease appear, we may find persistent derangement of the gastric functions, loss of appetite, a feeling of satiety after having taken only very little food, pain after eating, in general the symptoms of nervous dyspepsia which when they appear at an early age in one predisposed to tuberculosis by heredity or by his bodily constitution, should always draw the physician's attention to the lungs. On the other hand when there is a good appetite and good digestion, and yet in spite of rest and care the patient does not put on weight but even loses weight, suspicion of phthisis should again be aroused. Cardiac disturbance may at the same time be present: there may be increased frequency of the heart's beat even when the patient is at rest, there may be palpitation, or the patient gets quickly tired from running or going upstairs, there is a feeling of lassitude, decrease of muscular power and disinclination to activity. The heart is often irritable, and slight muscular exertion or ordinary mental influences at once cause great increase of the heart's action with a small weak pulse. The apex beat often extends farther to the right or left than is usual, it is strong and forcible, and contrasts with the weak pulse. In the early diagnosis of tuberculosis note must be taken too of recurrent attacks of hoarseness which quickly pass away; no change can as a rule be detected by the laryngoscope, it seems to be due to purely nervous influences. In other cases a true catarrh of the larynx and pharynx which is very obstinate and readily recurs is the initial symptom of pulmonary tuberculosis. These signs have nothing to do with genuine laryngeal tuberculosis, and this is also true of the peculiar anaemic condition of the laryngeal mucous membrane, especially noticeable near the epiglottis: this striking degree of pallor is said to be caused by atrophy of the mucous membrane which makes the muscles of the larynx unusually prominent (Roe). Many regard this anaemic condition of the larynx as of early diagnostic value.

In very doubtful cases use may be made of the tuberculin test to establish an early diagnosis, but though this method has been highly recommended it has not yet been introduced into practice, probably because it requires careful observation of the patient during several days such as is generally possible only in a hospital. For two days before the inoculation the patient's temperature should be taken regularly every two hours, in order to ascertain what is the normal condition. The patient is then inoculated with one milligram of tuberculin. Most are agreed that the old tuberculin is preferable to the new. After inoculation the temperature is again taken every two hours, and reaction usually appears eight to sixteen hours after inoculation. If there is no reaction the patient should be inoculated a few days later with three milligrams of tuberculin, and if necessary again later with six milligrams. If there is still no reaction we may be tolerably certain that there is no tuberculosis (Cornet). In some cases, even though there is no rise of temperature, inoculation helps us to make a diagnosis, because catarrhal signs at the lung apices become manifest, owing to increased exudation at the places where tuberculous processes are going on. Moreover when there is a positive febrile reaction, it does not necessarily point to a diagnosis of pulmonary tuberculosis, but only to the presence of a tuberculous focus somewhere in the body.

The question of marriage of tuberculous patients about which the physician is often consulted, is of special significance in connection with prophylaxis. The question as regards the effect upon any offspring of the marriage may be put altogether on one side, as it is probably never taken into consideration by those who want to marry. We need consider only the tuberculous partner in the marriage and the healthy one. If the disease has existed for a long time and is progressing the physician will absolutely forbid marriage, not only for social reasons but also because experience proves that such patients get rapidly worse after marriage.

In the initial stage of pulmonary tuberculosis, no general

rules can be laid down as to giving medical permission to marry. It is wisest in all such cases first to try to cure the disease; and this is best done by placing the tuberculous patient in a sanatorium for consumptives. A patient who is so far improved that he has had no pulmonary signs for two years and who is in a good state of nutrition may be allowed to marry. Medical experience has shown that a phthisical woman is exposed to great dangers by marriage; pregnancy and parturition often cause very rapid aggravation of the disease. The physician must therefore be even more careful in granting consent to marriage to a tuberculous woman than to a tuberculous man, and should never give it till he has first tried to cure the disease. For the sake of the healthy one too, the physician should withhold consent to marriage with a phthisical person. Cornet's statistics show that double tuberculosis in marriage occurs in twenty-three per cent. of the cases, and though we cannot in all the twenty-three per cent. attribute the double tuberculosis to infection of the sound partner in married life by the diseased partner, yet a number of medical observations leave no doubt that infection through marriage is possible. Those who wish to marry should be told of this danger by the physician.

The Prevention of the Diseases of the Lungs

By DR. RICHARD ROSEN

The Prevention of the Diseases of the Lungs

The consideration of the prophylaxis of the diseases of the lungs, of the heart and of other organs separately is not in accord with the division into "infective diseases" and "constitutional diseases." It is merely the old method of grouping diseases according to the organ affected, and may be retained as useful in describing the prophylactic treatment, though not in accord either with aetiology or pathology. For example, in bronchitis the invasion by bacteria is no less important as regards aetiology than it is in "infective disease"; it is moreover no purely "local" disease, but nearly always has general symptoms, as does an "infective disease." Nevertheless in bronchitis and other affections classed as "pulmonary diseases," the local disturbances are upon the whole by far the most important symptoms, and the old classification is therefore justified.

For the prophylaxis of pulmonary diseases, external injurious influences must be avoided and attention must obviously be given to the condition of the air, because it is the element which comes most closely into contact with the lungs, and because meteorological changes react upon the lungs. Indeed from time immemorial the instincts of the people have caused them to attach great importance to changes in the weather in the causation of pulmonary disease. The effect of air upon the lung is twofold: first, there is a direct effect depending upon respiration; but the breathing of air under varying conditions is not the chief causative factor of disease, because before it actually reaches the lung it has been modified by the natural protective processes. Indirectly however atmospheric

changes do cause disease of the lungs, through their action upon the skin. In former times cold was stated to be the cause of disease in far too great a number of cases, and further knowledge has shown that many diseases formerly attributed to cold owe their origin to bacterial infection. But in diseases of the air passages cold has maintained its footing and is considered of importance aetiologically; and it makes no real difference that bacteria assist the cold in the production of the disease.

The many theories about the nature of a "cold" (Rosenthal, Lode, etc.) none of which adequately explains the phenomena, will not here be further discussed. It seems however to be certain that chilling of a large surface of the body is not always necessary for a cold, but that the cold may be caused reflexly: a very brief action of cold upon a limited part of the body will reflexly produce very considerable changes in the distribution of blood to the internal organs, which may lead to circulatory obstruction at definite spots. This hyperaemia is a factor which makes disease possible. We may assume that there is then diminished power of resistance in the cells which enables bacteria to get into the tissues; but the whole process is not made more intelligible to us by this assumption. In different individuals again the *locus minoris resistentiae* is different; in some cases it is always one and the same spot which becomes affected by the same injurious influence, a cold. Experience shows that getting wet through often causes a cold, especially when the body does not continue in activity. A cold may also be caused by sudden changes of temperature, whether an atmospheric change—for instance after sunset at the seaside in the height of summer—or a change through going out of a heated house in the winter without sufficient clothing. Damp cold abstracts even greater heat from the body and is particularly liable to give a cold, and since in our latitude the transition months from winter to summer and summer to winter are accompanied by many changes in temperature and moisture, diseases caused by cold are very common at these times, as is proved by many statistics.

In Germany the commonest *locus minoris resistentiae* for colds is the mucous membrane of the air passages, and therefore catarrhs of the bronchi and of the trachea are very common diseases. The predisposition to bronchitis is general, even robust natures are not free from it, although usually weak anaemic people are more susceptible to it (Riegel). Bronchitis is apt to appear at every period of life, though the mortality is particularly great in childhood.

Bronchitis is so common that prophylactic measures are indicated for all, particularly when we remember that a large number of pulmonary diseases are often the result of bronchitis—not only chronic forms of bronchitis, but also emphysema, catarrhal pneumonia, capillary bronchitis, pulmonary collapse, and lastly though not so obviously bronchial asthma. It follows therefore that the prevention of bronchitis is at the same time the prevention of a large number of other pulmonary diseases, and to a certain extent also of pulmonary tuberculosis.

Geigel was the first to point out that during the first year of life more legitimate children die of respiratory diseases than illegitimate children, though the converse is true for deaths from digestive troubles ; and he explains it by the fact of the greater coddling of legitimate children. Many objections may be raised to Geigel's conclusion, yet it is supported by the fact known to all, that coddling often leads to bronchitis and to other diseases as a consequence of taking cold, and that bracing the skin is the best protection against taking cold, and therefore also against bronchitis, which is the most common result of the cold. Children in their first year of life and very old people may, to a great extent, be directly protected against such injurious influences if they remain in warm ventilated rooms when the weather is bad, or very windy, or damp and cold. With most people such prophylactic measures are naturally not practicable, they are obliged to go out in all weathers. Those who are able to take such precautions and who know by experience that a particular state of the weather readily gives them cold, should be urged to guard against such direct influences so far as possible. Others

must be directed to wear suitable clothing according to the weather and the principles of hygiene.

Recently dress material has been manufactured which is impregnated with substances to make it waterproof, but the impermeable material causes a retention of vapours given off by the skin, which is disagreeable and will prevent this material from being extensively used.

For the large majority therefore the most valuable preventive measure against bronchitis is to harden the skin, that is to accustom it to the most diverse conditions of the weather. Through his dress and by constant living in rooms, the civilized man seems to have lost the power which his skin possessed, in common with that of animals and of uncivilized races, of reacting promptly to the various changes of temperature by different degrees of contraction. This function of the skin is merely a question of practice, in the same way as the functional activity of all other organs is brought about in response to various demands made upon them. For this reason the countryman is upon the whole more robust than the town dweller; the countryman's skin is exercised from his youth and is therefore hardened and needs no special artificial methods. The town dweller on the other hand gets too little away from the even temperature of his room, and the streets moderate considerably the power of the wind. Yet an atmosphere which is in movement deprives the body of more heat than a calm atmosphere, even though the latter be colder. The town dweller gives his skin too little practice as an organ which regulates the heat of the body, and if he exposes himself to any great change of atmosphere, to a wetting or similar influence, the compensatory activity of the skin fails him.

For this reason the skin should not from the very earliest years be too anxiously protected from coming into direct contact with the atmosphere; the dress should be porous and not too much in quantity. Lately more attention has been given to the matter, and it is taught that children should, from their earliest youth, not be kept too warm; that binders should not be used, that bed cover-

ing in the summer should be simple, a blanket and sheet, and in the winter a moderately thick eider-down quilt; and the child should not lie upon a feather bed. The bedding of adults is liable in general to be far too much, and so too the clothes they wear. A physician has many opportunities for observing this. No small number of men wear a woollen vest under the linen shirt in summer, much the same indeed as they wear in winter, and they wear it for fear of catching cold. Indeed they would take cold if one day they suddenly altered their habit and left off the woollen vest. Through coddling their skin has lost its compensatory power. This is not the place to discuss in full the question of dress, and we shall merely point out the necessity of avoiding from youth up the wearing of too many clothes. In the summer linen underclothing and a light woollen or cotton suit over this is sufficient; in the winter a thicker under garment should be substituted, or perhaps two thinner ones. It is impossible to give rules for dress which are suitable for all. Weak anaemic people require more clothes than the robust. The one-sided "dress systems" advocated by some apostles of health are not based upon scientific principles, nor are they of practical value for all. It is important that physicians should concern themselves more with the dress of patients and its suitability. Great mistakes are made about clothing, and it is most essential that a beginning should be made in the very earliest years to strengthen the skin.

With clothes we introduce something which is artificial into the domain of nature, and the natural function of the skin is restricted from the very outset. To remove the effect of this disturbing element in the economy of nature, it is desirable to use some counter-effect upon the skin and to subject it systematically to the stimulus of cold for brief periods, and cold water is best adapted for this purpose. Cold water produces a powerful contraction of the cutaneous vessels, and when afterwards the skin is well rubbed or the body is exercised, the vessels dilate and a feeling of well-being and of warmth pervades the whole body. This cold water procedure should be gone through daily, best in the

morning after getting up, and should be commenced in the first year of life. In this way the activity of the skin is stimulated, and it reacts promptly to the stimuli of changes of temperature to which it may be exposed. If children are fairly strong, one may begin a few weeks after birth, and pour cool water over them after the daily warm bath. Children are generally bathed in water which is much too hot: the bath water should never be above 95° F. A bath thermometer is too seldom used in the nursery: the heat of the water is judged by the hand or the elbow, and the result is that the temperature is frequently too high. A difference of only two degrees in the heat of the bath water will make a very great difference in the effect of the bath upon the body. Baths at a higher temperature than 95° F generally stimulate strongly and are followed by exhaustion, and should therefore as a rule be avoided. After the first months the bath temperature is gradually reduced for children from 95°F to 93° and 90°F; the bath should not last longer than five or ten minutes. After the bath cooler water should be poured over the child and the skin be well-rubbed. Later, in place of the daily bath, the whole body should be rubbed down daily with a rough towel dipped in cold water and then rubbed dry. Warm baths with the addition of aromatic substances, and brine baths, are no longer so much in vogue for children as formerly; the increased metabolism which one hoped to bring about in anaemic and scrofulous conditions often did not appear. Rubbing down with water, gradually colder and colder, is now preferred (Heubner), as its stimulating effect is found to be greater. Lukewarm brine baths of short duration, at intervals of a few days, may be used with advantage, but should always be followed by the pouring of cold water over the body.

If a commencement has thus been made in early youth in hardening the body, cold water applications will be well borne all through the year and should be daily practised even in winter—cold rubbing down of the whole body, cold douches, cold baths, or possibly only cold sponging one part of the body. In his *Recollections of an Old Physician*, Kuss-

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maul narrates in a most interesting manner how as a young country practitioner he suffered much from colds, and how he made his body, which was weak and very sensitive to changes of the weather, quite weatherproof by washing his feet with cold water every evening shortly before going to bed; and from that time till the present he has never had a cold.

This shows that even when measures to harden the body have been neglected in youth, it is still possible later and in adult life to harden the body by the action of cold water, but it must then be undertaken with greater caution, must not be begun in winter, and the measures must not be too vigorous and the water not too cold at first.

There are people who are particularly susceptible to a chilling of some one part of the body, who cannot go out of doors with the head uncovered without taking cold, and who have always to wear a neckerchief, or chest protector, or abdominal belt, or mittens, or gaiters, to keep themselves in good health. All these are coddling ways which could generally be done away with if the body were properly hardened. Moritz Schmidt says it is astonishing to see how many people coddle and weaken their bodies in the most terrible way, although they know and see the obvious advantages possessed by one who is robust; it is probably because the sensation of warmth is pleasanter than that of cold; but when once the body is hardened the cold will no longer be felt to be unpleasant.

However there are individuals who have some real *locus minoris resistentiae* and who would at once become ill if they neglected the ordinary precautions they have been accustomed to take. This must be specially considered in the case of old people, and it would be altogether wrong to proceed with measures to harden the body regardless of this. In such case the wearing of flannel next the skin is a good protection against changes of temperature, and it may be a flannel under-garment covering the whole body, or a flannel binder, cloth or wrap to be applied to that part which is known to be specially susceptible. The feet are often the most susceptible parts, as they are farthest from the heart

and the circulation there is most feeble. Many people suffer constantly from cold feet which are either moist or dry; and these cold feet are often a cause of bronchitis which in such cases soon becomes chronic and will not be cured till the original cause has been removed. We have known many chronic irritative conditions of the tracheal and bronchial mucous membrane cured by simple directions about changing the stockings once or twice a day, and proper care of the feet, by means of baths and rubbing with a spirit lotion and so on. All physicians know how negligent and careless about their body the large number of people are, and that a doctor has to ask searching questions about all the details of the bodily functions; till then a patient often does not know that some part of his body is not acting normally, because he has no pain. And often he has not noticed that his feet are damp and cold until the doctor puts the question to him. One should not neglect to advise weak and susceptible persons to be careful to wear galoshes in rainy weather; often too it is useful to wear soles inside the boots, which are made of some material that is not a good conductor of heat.

The air in inspiration is brought into direct contact with the air passages, and faulty physical or chemical conditions of the atmosphere may cause disease: for the prophylaxis of these diseases the condition of the air inspired must be normal. This subject is really a part of general hygiene: it is concerned with the methods for regulating the condition of the air in rooms; the removal of certain gases and vapours generated in various industries, which if breathed would lead to severe acute or chronic pulmonary affections; the prevention of excessive quantities of dust in the air of workshops, which in the case of mineral dust would gradually lead to extensive injuries of the pulmonary tissue —for instance siderosis and chalicosis; and the measures which would protect the workmen against the dust.

The nose is a natural protection against the usual oscillations in the condition of the air, variations in temperature and amount of moisture and dust; and it is most essential in the prophylaxis of diseases of the lungs that

this nasal function be normal. The nose in its natural condition has an important function to perform in respiration, and deviations from the normal condition soon lead to diseases of the air passages.

Normally the nose prepares as it were the air for the lungs, saturates the air with moisture—at least this is the view held by most authorities—and warms it almost to the temperature of the body. Aschenbrand and Bloch found that the air was warmed up to 86° F. whatever the temperature of or amount of moisture in the external air. Normally too the nose removes all impurities from the air, retaining dust and micro-organisms on the moist mucous membrane of the meatus; and some are prevented from entering by the vibrissæ at the nostrils. Abnormal internal conditions will be occasioned by any deviations from the normal of the air which has reached the lower part of the respiratory tract. Obstruction of the nasal passages by polypi, swelling of the turbinates, adenoid growths and similar affections will more or less limit nasal respiration, and oral respiration becomes necessary. But oral respiration cannot permanently take the place of nasal respiration because the mucous membrane of the mouth and throat soon gets dry, as everyone knows who has had to breathe through his mouth when suffering from a nasal catarrh, particularly in a dry heated room. After tracheotomy too the air has to be kept permanently moist by artificial means. Dust and other injurious particles are not filtered from the air by oral respiration, and for this reason the trachea and bronchi soon become affected. Though there is no obstruction to the passage of the air through the nasal cavity, yet if the mucous membrane of the nose is affected and unable to perform its normal function of preparing the air, especially in chronic atrophic conditions of the membrane, the air is then not properly prepared and reaches the deeper air passages in too dry a state, and the result is again bronchitis. The normal nasal mucous membrane alone has the marvellous capacity of compensating for differences in the degree of warmth and of moisture by reflexly regulating the blood supply of the mucous membrane over the turbinate bones.

In the prophylaxis of bronchial affections much attention must be given to the condition of the nose. Nasal affections must not be regarded as purely local disturbances, but in view of the important part played by the nose in respiration should also be regarded as important factors in the production of serious and generally chronic affections of the lower respiratory passages. Diseases of the nose should therefore be treated early. There is a reflex action between the nasal mucous membrane and the mucous membrane of the finer bronchial tubes, and for this reason too it is an important prophylactic measure to keep the nose in a normal condition. B. Fränkel and Voltolini were the first to point out that some cases of bronchial asthma are connected with affections of the nasal mucous membrane, more particularly with polypi of the nose and throat; for when the polypi were removed, the attacks of asthma ceased, but recurred when the polypi grew again. Whatever may be our theory about bronchial asthma, whether we incline towards Biermer's view and regard contraction of the muscular elements of the bronchi as the essential cause, or whether towards Weber's, and think the essential cause is the swelling of the bronchial mucous membrane through dilatation of the vessels and subsequent exudation, nevertheless it is probable that central nervous influences are the main cause, and that the nasal affection can act as the exciting cause of the central irritation. So that removal of polypi and other affections of the nose may be regarded as a prophylactic against asthma.

The maintenance of the natural elasticity of the lungs or the prevention of emphysema is another important object for prophylaxis. Pulmonary emphysema is one of the most frequent pathological conditions. Not only is there the primary essential emphysema, but secondary emphysema sooner or later is liable to develop after all diseases of the lungs. In certain chronic pulmonary affections and in whooping cough in children we should always remember to take measures to prevent emphysema; such precautions are specially needed in illnesses accompanied by violent and long continued attacks of coughing, such as occur in many

forms of chronic bronchitis and pleural affections. Traube teaches that the chronic dry bronchitis of the finer bronchial tubes readily leads to emphysema, less so the chronic bronchitis accompanied by copious expectoration and large sized râles. By the forced efforts of expiration the pressure in the thorax is so greatly increased that the counter pressure exerted by the auxiliary expiratory muscles of the thorax is not sufficient to compensate for the increase; the alveoli then yield to the pressure and become distended. Frequent repetition of this distension in course of time leads to the disappearance of the alveolar interstices, characteristic of emphysema. For these reasons, as well as for others, measures should be taken to prevent those violent paroxysms of coughing, which are particularly common in so-called "dry coughs"—either by sedatives, by the avoidance of all causes that are known to set up coughing, by residence in a suitable climate, possibly in a southern climate, or by other means which the physician may find necessary for any special case.

Some callings predispose to emphysema of the lungs, namely those which require prolonged and excessive respiratory efforts, such as the playing of wind instruments or blowpipe work; packers and porters often get emphysema, as the continuous strain due to the heavy work is in addition to the compression of the chest, and the expiration of the air in the lung, which is at a greater pressure than normal, is prevented. Occasionally emphysema comes on somewhat suddenly in healthy people after some unaccustomed great overstrain, especially when in addition there is a predisposition to emphysema brought on by any of the callings mentioned above; it may set in after lifting a heavy weight, after excessive exercise, such as cycling, rowing against the wind, or wrestling. Prophylaxis naturally requires that all unaccustomed overstrain should be avoided which would make excessive demands upon the activity of the lungs. Yet as in the case of other organs, so too with the lungs, exercise is a valuable means of keeping them sound, and when an increased demand is made upon an organ, the organ which has not been exercised gives way,

while one which has been exercised responds to the extra demand and remains healthy. An hygienic mode of life by exercising the lungs will preserve their elasticity, and walking is good and deep breathing out in the fresh air, or for the young gymnastics, out-of-door games, running and sports in moderation. Barth has lately in a very interesting work recommended singing as a preventive against diseases of the lungs, it deepens the inspirations and increases the exchange of gases, and it is at the same time good gymnastic exercise for the lungs, which are thereby accustomed to adapt themselves to considerable variations in breathing.

To a certain extent the diseased lung also is able to adapt itself to the demands made on it by developing increased respiratory activity in those parts of the lung which are still unaffected. This compensatory hypertrophy of the healthy parts occurs when only small parts of the lung become successively affected, and there is time afforded for the healthy parts to adapt themselves to the demands made upon them. There are cases in which the whole of one lung has thus become useless, while the other lung has remained healthy and sufficed for the needs of the body. In cases of chronic bronchitis, fibrosis, collapse of the lung, and pleural adhesions, the healthy lung tissue that remains is often sufficient only however when the whole body is at rest or at the most only slightly exerted. The usual result of these affections is the development of so-called vicarious emphysema: the air is unequally distributed through the lungs, and the normal pulmonary tissue is exposed to greater pressure and gradually becomes distended. This vicarious emphysema develops the earlier the greater the intra-thoracic pressure: that is, the more the diseased condition is disregarded and the greater the demands made upon the still healthy parts of the lungs. In these chronic conditions where large parts of the lung tissue are unable to act, the amount of work to be done must be very carefully regulated and over-exertion avoided, so that the increased functional activity of the normal parts of the lung, even when the body is at rest, may not be still

further increased and thus the development of emphysema assisted. When the inflammatory processes have subsided or have considerably improved, methodical respiratory exercises are most valuable as a prophylactic, gradually to increase the functional activity of the lungs. For this purpose graduated walking exercise is of value, and also going up and down stairs, a few stairs being added from time to time, and other similar graduated exercises.

Prophylaxis of the various forms of so-called catarrhal pneumonia is in the wider sense similar to the prophylaxis of bronchitis, in so far as catarrhal pneumonia generally follows bronchitis, and rarely occurs independently. It follows therefore that when there is bronchitis, measures should be taken to prevent catarrhal pneumonia. This opens a wide field for prophylaxis, especially in the case of children and old people in whom this form of pneumonia frequently occurs. The way in which bronchitis in children must be treated to prevent collapse of lung and the development of pneumonia in these collapsed parts is dealt with in the special section on the diseases of children. In old people who for any reason have become bedridden, hypostatic congestion is apt to cause the development of bronchitis and broncho-pneumonia, and even lobar or so-called hypostatic pneumonia. Similar conditions arise in patients of any age when serious illness has confined them to bed for a long time and when wasting and cardiac weakness are present, so that the blood, obeying the law of gravitation, sinks to the lower parts of the lungs. It is most often met with in typhoid fever after the third week. The prevention of hypostatic congestion in such cases requires careful nursing; the patient should not lie always on the back, other positions should be adopted in turn, and when possible the prone position is much to be recommended. Old people should be propped up as often as possible and should be confined to bed only so long as is absolutely necessary. Old people should not for slight reasons be kept in bed, for experience shows that it is very difficult for them again to leave it. The patient should several times a day practise taking deep inspirations, and whenever possible should sit upright for

this exercise. If respiration is especially shallow and rapid, it must be deepened and made slower reflexly through stimuli applied to the skin, such as cold sponging, perhaps lukewarm baths followed by douching with cool water. It is also useful to rub the patient with spirit liniments: a five per cent. solution of menthol is the best.

Reference must here be made to serious pulmonary affections, such as bronchitis, bronchitis foetida, broncho-pneumonia and gangrene, caused by food particles getting down the respiratory passages, and to the necessity of preventing this in patients who are very ill by careful instructions to the nurse. In feeding such patients the head must always be supported in the nurse's left hand, while with her right hand she gives food with a teaspoon. It is best to raise the patient, because in the horizontal posture food is much more easily drawn into the respiratory passages in inspiration. The patient should at the same time be asked to swallow; the spoon, a teaspoon being best, should be carried as far back as possible into the mouth and exactly in the middle line. The sides of the food passage are very much more sensitive to stimuli than the median parts, and if the food does not pass along the median line but touches the sensitive lateral walls, reflex movements are set up which carry the food into the respiratory tract with inspiration. (Mendelsohn and Gutzmann.) The more the body deviates from the upright posture towards the horizontal, the more easily, especially in the case of fluids, will food leave the middle line of the body and flow towards the sides. To give food while the patient is in the lateral position is therefore obviously wrong.

The Prevention of Diseases of the Heart

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The Prevention of Diseases of the Heart

HEART LESIONS AND HEART WEAKNESS

A "CARDIAC LESION" becomes a disease directly the heart is no longer able to fulfil completely at every moment of life the demands made upon it which are essential for the maintenance of the functional activity of the organism. No other organ of the body can be considered to be similarly circumstanced—for other organs when diseased or threatened with disease may be rested and for a time saved from all functional activity; but this is not possible with the heart, which has to act uninterruptedly and continuously from a time long before the first breath is drawn until the last moment of life. Any cessation of the heart's action would mean cessation for ever. The heart then must act ceaselessly during the whole of life; it must also constantly keep up a circulation which shall be adequate for all physiological processes. This is the essential criterion of a clinically sound heart and is indeed the only criterion. "Heart disease" begins—no matter whether the heart has already undergone anatomical changes or not—only when the functional activity of the heart becomes inadequate; and the sole object of prophylaxis is to prevent such a condition of functional inadequacy from setting in prematurely.

The prophylaxis of heart disease has two special features. First, in those cases where there is already heart disease in the purely anatomical sense, but in which the functional activity of the heart has not yet fallen below the normal, the aim must be to maintain this functional activity notwithstanding the anatomical change: this is prophylaxis not therapeutics. This cardiac lesion is not a disease until

the functional activity begins to be inadequate; and to prevent the development of disease in spite of the anatomical changes which are present is in these cases one of the most important objects of medicine, without which there would only be a hopeless struggle against irreparable anatomical changes in the muscle substance or the valves of the heart. Prophylaxis during the development and course of a disease is probably of wider application in heart disease than in any other branch of internal medicine. And the second special feature about heart disease is that the measures which are useful in preventing the development of functional disturbances are essentially much the same for whatever form of heart disease they may be required; because, as already indicated above, the chief and most important object of prophylaxis is not so much the possible prevention of anatomical changes, as the maintenance of normal functional activity in a heart which has already undergone such changes. For this purpose the appropriate prophylactic measures are the same whatever be the anatomical lesion of the heart which has caused the functional inadequacy.

The prophylaxis of heart disease rests then chiefly upon regulating so far as possible the relation between the functional demands made upon the heart and the functional capacity of the organ. The aim of all internal therapeutics indeed is an attempt to equalize the demands made upon an organ and the functional activity of that organ at the same time that the possible duration of life is not shortened: that is to make the relation which exists between these two magnitudes a fraction in which the numerator is equal to the denominator; and therapeutics fulfils its object just as completely when, without any ill effect upon the organ and the whole body, it has temporarily or permanently reduced the demands upon the organ to its functional capacity, as when on the other hand it has succeeded in increasing the functional activity though the demands made upon the organ are as great as before. When a heart whose functional activity is reduced is permanently spared from some of its work so that it is able efficiently to meet the remain-

ing demands made upon it, therapeutics has completely fulfilled its object, and considered from the standpoint of prophylaxis has in this way prevented an anatomical affection from becoming a functional one, and a morphological lesion from becoming a physiological disease.

The quantitative functional activity of the heart is made up of two components: firstly, the minimum functional activity required for the maintenance of an uninterrupted circulation in the body, when that circulation is not made more difficult or complicated by external or internal influences of any kind whatsoever; and secondly, a varying quantity of functional activity required in addition to the former to meet the demands of daily life. These demands result from bodily and mental activity, or are the effect of external stimuli or of internal stimuli due to bodily functions, and to the overaction of organs which thus influence the distribution of blood, as well as of all the accidental occasional demands made upon the heart. The former or minimum of cardiac activity is approximately that of the heart during sleep; and this amount naturally cannot be reduced in any way. But the second component includes a great amount of work which may be reduced; and though naturally, even when patients' surroundings are most favourable, it is not possible to remove entirely all such extra demands upon the heart, yet a very large part of such demands may be avoided; and when this is carried out carefully and continuously and above all is done early and adequately, heart disease may be entirely prevented: that is disturbances of function may be prevented. This is the task of prophylaxis; and when we succeed in keeping a patient who is suffering from mitral incompetence free from disturbances of function till his eightieth year of life, the defect of the valves may possibly have some interest for pathologists, but the physician considers throughout the patient's life only the diminished functional activity of the heart; and it was his duty to maintain the organism in its normal functional condition in spite of the valvular deficiency. Moreover the prophylactic measures required are the same in any given case, whether the diminished

functional activity of the heart is the result of any valvular lesion or of some other diseased condition which reduces the power of the heart muscle.

For every heart—for the healthy heart, and still more for the heart predisposed by some heart lesion to the risk of becoming incompetent—there is a maximum of total functional capacity, up to which maximum work may be done without injury to the heart. Of this total quantity a certain greater or less amount of work is essential for the "vegetative" or "internal" work of the body. The less capable and efficient the heart, the greater is the proportion of the total work which is required for these internal functions, and the smaller will be the proportion which remains for the various other demands which may be made upon the heart. The relation may be expressed in terms of political economy as follows: when the general conditions of life have risen, when prices have risen and everything in the market becomes dearer, an individual who has the same fixed income every year will be obliged to spend a considerably larger amount of his yearly income upon the necessaries of life, house, dress and food, and there will remain a smaller proportion of income for luxuries. So long as a head of a family restricts his expenditure upon luxuries to this surplus of his income, the two sides of his account, the debtor and the creditor, will balance. So too with the heart—if its total capacity for work has been lowered, a greater relative part of its functional capacity is required for its indispensable work, and prophylaxis is concerned with seeing that the surplus alone is expended upon other forms of activity, in order that the balance may be maintained.

For the medical treatment therefore of any case it is essential that a diagnosis of the functional capacity of that individual heart should first be made. The question is not what special morbid condition has affected this heart which is to be prevented from becoming incompetent, but rather what amount of loss of functional capacity has it undergone. A great and necessary step forward will have been taken when the diagnosis of diminished cardiac capacity has been made, and adequate prophylactic measures have been adopted, before

those extensive and irreparable changes in the heart have developed which alone make a physical diagnosis possible.

This is not the place to discuss the details of the functional diagnosis of heart disease; for this reference should be made to textbooks on the diagnosis and pathology of cardiac disease, especially the excellent one by O. Rosenbach. A truly scientific prophylaxis of heart disease can only be carried out by the physician who makes a functional diagnosis, not an anatomical one. It is not enough merely to auscultate and percuss, and when nothing abnormal has been detected by this procedure to conclude that special prophylactic measures are unnecessary. Even when there is no such organic abnormality present in the heart, its condition and functional capacity should be determined in every possible position of the body—when sitting, when standing, when lying down, at rest and after different degrees of bodily exertion, when the breath is held and during forcible respiration, when the abdominal pressure is increased, after a full meal, and after much liquid has been taken up by the circulatory system through drinking a large quantity of fluid, as well as when other influences have been at work. In this way by noting the results of such influences it is possible to determine which external influences suffice to call forth pallor, cyanosis, coldness of the extremities, or stupor, giddiness, pains over the heart, and other signs of cardiac weakness; and thence it is possible to draw conclusions as to the functional capacity of the heart. The degree of limitation of functional capacity of the heart gives us the clue to the prophylactic measures required for any given case.

DISEASES WHICH PREDISPOSE TO CARDIAC WEAKNESS

The most important aim of prophylaxis in heart disease is to prevent cardiac weakness, whatever be the nature of the cardiac affection out of which such cardiac weakness may arise; and further whenever it is possible another object of prophylaxis will be to prevent the development of conditions which will in course of time lead to cardiac weak-

ness. This is extremely difficult and seldom practicable, because almost all lesions are secondary lesions arising out of primary affections, some of which may date back to foetal life; in these cases prophylactic treatment to prevent the cardiac lesion is impossible, or is possible only in so far as it is coincident with the treatment of the primary affection. In describing the prophylaxis of heart disease it is not necessary here to describe in detail the prophylaxis of the numerous affections during the course of which myocarditis, or more correctly myopathic cardiac weakness, may develop; it will suffice briefly to allude to these; their prophylaxis is described elsewhere and also their treatment. The more thoroughly these affections are treated the greater is the possibility that the subsequent development of cardiac affections will be prevented.

The chief of the affections which lead to heart disease is acute articular rheumatism. It is obvious that the prevention of subsequent heart disease is best accomplished by preventing as far as possible attacks of acute rheumatism, particularly in patients who have already had an attack of this very dangerous malady. The measures intended to prevent articular rheumatism itself are at the same time prophylactic measures against the endocarditis, and need not be described here at length—a suitable method of life, precautions after overheating the body, methods to harden the body, careful treatment by baths and friction, adequate clothing appropriate to the season of the year, and many other similar precautions. And when the patient is attacked by articular rheumatism the most adequate treatment of the rheumatism will again be the best preventive of a heart lesion. There is not however always an exact relation between the two. Although endocarditis in acute rheumatism is doubtless one of the local manifestations of acute rheumatism which has affected both the joints and the endocardium, yet the severity of these two local manifestations is often very different. Often but not always in a case of severe acute rheumatism affecting many joints we find endocarditis also well marked; yet recently I saw a case of severe endocarditis in a mild attack of rheumatism affecting

only a single joint. Whatever may be the explanation of such exceptional cases nevertheless careful treatment of the articular rheumatism is the most essential factor in the prophylaxis of cardiac disease.

The same remarks are applicable to all infective diseases. It is well known that endocarditis and myocarditis are apt to develop after measles, scarlet fever, smallpox, typhoid fever and pneumonia. Diphtheria is specially dreaded because of its dangerous effect upon the muscular substance of the heart, which often manifests itself by a sudden diminution of the functional activity of the heart long after the diphtheria has been cured and while the individual is apparently in the best of health. Here too the most thorough treatment of the acute disease is identical with the prophylaxis of the subsequent cardiac affection, although a mild and uneventful course of the diphtheria will not necessarily prevent the heart from becoming affected.

All febrile affections, particularly when the temperature has long remained high, tend to cause cardiac degeneration and myocarditis, which will be the more severe and irreparable the longer the hyperpyrexia has lasted. If, as seems to be the case, the changes in the myocardium are brought about not so much by the original cause or by the toxines and ptomaines but by the long continuance of the high temperature, then antipyretic treatment of the original affection will at the same time be an effectual prophylaxis of the consecutive cardiac weakness.

Further, in all diseases which affect the nutrition of the heart prevention and adequate treatment of the disease is at the same time prophylactic treatment for the heart. All diseases of the blood, especially chlorosis, the different forms of anaemia and leukaemia, reduce the nutrition of the cardiac muscle, but if the disease has not lasted too long the nutrition of the heart muscle can be restored, even though, as often is the case, the weakened myocardium has undergone a slight degree of dilatation. Here again treatment of the constitutional disease is identical with prophylaxis of the cardiac affection. So too with arterio-sclerosis: it is well known that sclerosis of the coronary arteries prevents

the efficient nutrition of the heart, damages the heart muscle and gives rise to serious symptoms.

This is also true about poisons: prevention of the original cause is prophylaxis for the heart. Phosphorus is the most important of these poisons. In close relation with it are acute yellow atrophy of the liver and similar degenerative processes which give rise to cardiac degeneration.

Special mention must be made of obesity. The fat accumulates in large masses beneath the epicardium and mechanically hinders the movements of the heart; or layers of fat may extend between the bundles of muscle fibres, or the muscle substance of the heart may itself later undergo fatty degeneration and become less and less capable of contracting. The prophylactic measures are those for obesity in general, for they will tend to prevent this form of weakness of the heart at the same time as they prevent the general obesity.

INDIVIDUAL CARDIAC FUNCTIONAL CAPACITY

Although in many cases the preventive and curative treatment of various diseased conditions will serve at the same time to prevent cardiac lesions, yet there are cases which we must now consider by themselves in which the physician is called upon to treat existing cardiac lesions which are anatomically irreparable, and to devise suitable prophylactic measures. Many individuals are exposed to the danger of cardiac insufficiency though they have never suffered from articular rheumatism nor from any of the primary diseases enumerated above which are apt to affect the heart. Those with "sound hearts" as well as those with "diseased hearts" should be considered by the physician in respect to prophylaxis because, as we stated at the beginning, one of the most valuable and most satisfactory tasks of the physician is to suggest prophylactic measures to prevent cardiac insufficiency from developing. Just as the optical apparatus of every eye possesses its own power of refraction and every biceps muscle has its own power of contraction, so too every heart has its own total functional capacity, the differences in capacity being the result either of indi-

vidual idiosyncrasies of the heart itself or of the mode of life, or more especially of the after effects of other diseases which have affected the muscle or valves of the heart. To estimate this individual functional capacity and then to adapt the life to the capacity of the heart is the aim of prophylaxis in heart disease.

In describing prophylaxis it is necessary to consider one by one the various symptoms which may arise from heart disease. Then we shall consider the main causes in every-day life which tend to injure the heart, and especially a heart already threatened with insufficiency, and then shall take into consideration how in daily life these injurious effects may be prevented.

REST AND ACTIVITY

The most important of the measures for preventing the heart from becoming insufficient is the regulation of the amount of physical work which the patient may do. During the last ten years, mainly through Oertel's vigorous and energetic initiative, the statement has been made that every heart which has been weakened by disease of its valves or of its muscle substance or from any other cause may be strengthened by methodical exercise, that by steady and gradual increase of the demands made upon the heart a large amount of compensatory hypertrophy may somehow be established, and the heart be thus rendered permanently capable of satisfactorily doing its work. This opinion, especially when stated as a general fact, is surely incorrect. Nature in the wise and inscrutable efforts she makes for the preservation of the individual certainly produces a compensatory hypertrophy of some part of the heart when that part is unable efficiently to fulfil its work. That is doubtlessly correct. But the amount of the hypertrophy required and the degree of hypertrophy beyond which it may not be arbitrarily increased can only be determined by the organism, never by the physician. All cardiac hypertrophy must rather be looked upon as a makeshift, a using up of the capital instead of the interest on the capital, and clinical experience is continually showing us that even when such

hypertrophy of the heart has in any individual case restored the functional activity of the heart to its normal amount, the hypertrophied muscle produced by the increase in the work soon gives way. The object of well devised prophylactic measures is not the attainment of a merely momentary increase of functional activity. When the heart muscle is degenerating, either indirectly through excessive demands upon its activity as with valvular lesions, or directly through changes affecting the muscle as in myocarditis, it is never possible, least of all by renewed and oft repeated over exertion, to increase its contractile power beyond the limit which its constitution has fixed and convert it into energy. When it has apparently been possible by such exercise to produce hypertrophy and increase the heart's strength, we have merely built up one part at the expense of another, and the greater the hypertrophy thus built up the more quickly does the degeneration proceed. But this is the very thing we have to prevent. The object of prophylaxis should be to maintain cardiac compensation as long as possible, and the attempt to stimulate the heart to increased activity by exercise will, as soon as the increased demands made upon it are excessive, produce cardiac insufficiency which may be temporary or even permanent. I have often observed this in clinical practice, and quite agree with Liebermeister who says that death has been hastened in many cases of heart disease during the last few years. "A good horse dies in the shafts" when the driver is ignorant.

It is true that exercise for the cardiac muscle is indicated sometimes: in cases in which the muscle itself is healthy and the diminished functional activity is caused mechanically by deposits of fat outside the muscle substance. The conditions are then similar to those met with in the arm muscles of an athlete, which are normal and healthy in themselves, but which have not yet reached the highest possible degree of development, and therefore may be strengthened by systematic exercise. Those persons in whom want of activity has reduced the cardiac power may supply this want by systematic exercise which makes demands upon the heart, increasingly greater and greater,

and thus increases its functional activity. Even here we must act slowly and with moderation, and the condition of the functional activity of the heart should be carefully and constantly watched; even the very slightest degree of overstrain must be avoided, because it is well known that overstrain may seriously affect a heart which was originally perfectly healthy.

One single acute over exertion may lead to acute dilatation. This depends partly upon the severity of the sudden over exertion, but still more upon the heart itself and its individual capacity of reacting against the injury. This shows how important it is that, as already stated, the functional capacity of the heart should be examined in every patient. It is most valuable in such a case to have made the discovery that the heart responds by signs of commencing insufficiency to a certain amount of extra demand made upon it, and thus be able to warn the patient against future exertions which are beyond the capacity of his heart, and so save him from developing cardiac insufficiency. The observation has often been made that severe infective disease leaves the heart so weak that the mere effort of raising himself up in bed has caused the patient to faint: here the mere physical effort of raising himself has overstrained the heart. In a considerable number of other cases too, some one excessive bodily effort has sufficed to call forth signs of cardiac incompetence. Prophylaxis is here of the utmost importance, and when we have determined with tolerable certainty the functional capacity of the heart, whether this be normal or subnormal, and the amount of extra exertion of which it is capable without injury, we are able to forbid all that would cause overstrain.

An even more important cause of injury to the heart, because less obvious and very common, is over exertion at sports and especially in cycling. Several years ago I pointed out that cycling is characterized by the peculiarity that the strain and overstrain caused by that form of physical exercise are not subjectively felt by the cyclist in the same degree as in other forms of physical exertion; and that fatigue and the need for rest are not felt till some time

after excessive demands have been made upon the heart, and during this time the heart has been subjected to considerable overstrain. A careful prophylaxis is very essential in this connection; the functional capacity of the heart, whatever be its condition, should be carefully estimated, and the effect of cycling noted before it is permitted as an exercise, and even the strongest cyclist's heart should be watched and the exercise regulated and adapted both in kind and in degree to its capacity. Where these precautions have not been observed, serious injury and not a few cases of sudden death have been known to result from cycling. The same is true of running, and of rowing, of mountain climbing and of all forms of excessive and continuous physical exertion.

A more difficult task confronts the physician when the over exertion is necessitated by the patients' occupation, and he cannot regulate this as he can the amount of cycling. The regulation of the amount of physical exercise is the more necessary as a prophylactic measure, because in many occupations where men have to work hard, several injurious factors are apt to be combined, all of which cause injury to the heart; for example, Jürgensen has pointed out that the "Tübingen heart," a myopathic form of cardiac insufficiency which is so common in the district of Tübingen among the people who are employed in the vineyards, is to be attributed to the fact that the men have to carry heavy weights and at the same time go up the steep mountain sides. Similar conditions are met with in those who carry heavy weights and in boatmen and in similar callings, particularly when these individuals are accustomed to take much alcohol. Restriction of alcohol is a valuable prophylactic, because alcohol has been proved to injure the heart.

Rest not exercise is therefore the main principle in the prophylaxis of heart disease; and our duty is to reduce the amount of physical exercise and not to increase it. The activity of the heart is increased directly in proportion to the physical exercise. This is effected through the nervous system which is constantly regulating the activity of the

heart, so that whenever metabolism is increased—especially by muscular exercise—the heart's action is at once increased in proportion; and a heart which expends all or most of its functional activity in the mere "vegetative" carrying on of the circulation, must be spared from further demands upon it made by avoidable physical exercise. The exercise should be restricted and reduced to a minimum. The increased demands made upon such a heart by physical exercise must never exceed those which can be responded to without causing any sign of commencing cardiac insufficiency, those for which the heart still possesses a sufficient surplus of functional activity. In other words, *rest* is the first essential in the prophylaxis of heart disease.

THE FORM AND AMOUNT OF REST FOR THE HEART

Thorough rest for the heart should at once be commenced and most carefully carried out in cases where an acute sudden reduction in the heart's functional capacity has occurred in the course of acute endocarditis or of any of the severe illnesses which are apt to injure the heart muscle. No great extra demand must be made upon the heart, sometimes indeed no extra demand at all, until the organ has gradually been restored to its normal functional activity. The patient should be kept at absolute rest in bed. If there is valvular disease the rest in bed should continue till adequate compensation has developed.

It is obviously impossible for every individual whose heart is not functionally quite healthy to remain in bed all his life or to be wholly inactive: every one desires to use his life and also to enjoy life, and a sensible man does both only up to the degree which is reasonable for him. Our task is to determine the amount of rest and of activity possible for each individual who needs to take precautions on account of his heart, and to show how this is possible in ordinary life. The total activity of which a heart is capable consists of two parts. Firstly, a constant part which is continuously and uninterruptedly required for "vegetative" cardiac work, for the simple carrying on of the circulation of the blood. And secondly, an inconstant part—a surplus constantly varying

in amount and dependent upon the sum of all the stimuli both external and internal which act upon the body. Thus there is for every individual a certain definite "physiological latitude" in the external influences which may be brought to bear upon the body—all the bodily and mental stimuli. Upon the metabolism which results from these, and upon the regulation of the heart through special nerve centres, the activity of the heart at any time depends.

Physical exercise is the most important and most frequent of these stimuli. This physiological latitude of the stimuli which act upon the heart is subject to great variations, and the heart remains efficient within certain limits. The lower limit is that amount of work done by the heart when the body is at rest and inactive, which is necessary merely to carry on the vegetative function of the circulation of the blood; the upper limit is the maximum of work which the heart can perform, and represents the largest possible sum of stimuli which can excite the heart to increased activity without making it inefficient. When the functional activity of the heart is small in itself or has become small by reason of acquired changes in the heart, then a large proportion of its total functional activity will be expended upon carrying on the circulation while the circulation is uninfluenced in any way, and a very small part, often a mere trifle of the heart's functional activity, remains over for possible use when demands are made upon it.

This is of the greatest significance in connexion with prophylaxis. Such a heart uses up a large part of its reserve strength in merely maintaining the circulation of blood, which in a healthy heart would be ready for use for physical and mental activity and all the other influences of life. The physiological latitude of such a heart is a very small one, and the limit up to which the heart's action may be increased by activity, especially by physical activity, without overstrain to the heart, is a very low one. The object of prophylaxis is to restrict bodily activity to an amount which will not cause the heart to work beyond this small physiological latitude.

Reference has several times been made to the diagnosis

of the heart's functional capacity, and when it becomes necessary to adopt prophylactic measures in any individual case, the physician can by repeated examination quite well form an opinion about the physiological latitude beyond which the cardiac activity must not be called forth by stimuli. He can find out what is the maximum increase of activity which the heart which has been working quietly while at rest can be called upon to perform, and thence can fairly accurately prescribe the amount of physical exercise which any given individual may take in addition to the other demands made upon that heart. But it is of course very difficult and often impossible to put side by side the many factors which in the form of stimuli combine to raise the activity of the heart when the individual is at work, and to estimate their mutual quantitative relations and thus be able, not only to prescribe the amount of bodily activity permissible, but also the amount of the manifold other activities. We can therefore give the patient only general directions, can explain to him so far as possible the nature of his condition and further urge upon him the duty of recognizing and keeping within the limits which he must not overstep. If the physician has thus properly instructed the patient and if the patient will carefully observe himself he will be far better able to guide his way aright than if he followed some scheme of rules drawn up for him.

To do this he must be guided by his subjective sensations. They constitute an extremely good sign of commencing disturbance of compensation and of commencing excess in the demands upon the heart. First there is palpitation of the heart, felt whenever the patient has undergone bodily exercise which is too severe or too long continued. One must not think that hypertrophy of the heart produces palpitation because the hypertrophied heart increases the heart's activity ; that is not the case. The subjective sensation of palpitation is never produced by hypertrophy but is always a sign whenever it occurs that demands are being made upon the heart which are beyond its capacity. Dyspnoea has a similar significance. In the prophylaxis

of heart disease patients should be told to notice when palpitation or shortness of breath is produced by physical exertion, to discontinue the exertion directly either of these symptoms appears, to rest, and not to resume the physical exertion until these signs have completely disappeared. Such self observation is not always easy, because the patient has to be on the lookout for the onset of two symptoms which are not very noticeable and are often overlooked and unobserved by indolent individuals and by people who are not very sensitive, and particularly by people belonging to the working classes who are under the impression that pain or some very obvious severe disturbance is the only sign of illness. Others too, even people with the highest and most delicate organization, often show remarkable carelessness as to the importance of subjective symptoms. In such cases we must with the assistance of the patient's friends employ the frequency of the pulse as the test of the amount of bodily exertion which is desirable. A patient whose heart is not sound must never attempt bodily exertion which makes his pulse beat more than one hundred times per minute. Directly the pulse has reached this frequency the patient must cease exercise and must rest the heart completely until the pulse rate has again fallen to the normal. Exercise approximately up to the limit of the heart's functional activity, and cessation of all exercise at the very first and most transient sign of cardiac tiredness, and resumption of activity only after the heart has completely recovered itself—such heart exercise only may be practised by a patient with diminished functional activity, and such exercises only are useful.

It has already been pointed out that only a normal muscle which has undergone no degeneration is capable of being developed by exercise, and reference was made to the biceps muscle of athletes as a case in point. Though exercise of the healthy muscle will with certainty develop its strength, it would be folly to exercise that muscle if myositis were present. It is exactly the same with the heart, and let us once more clearly state that these principles apply to all forms of heart disease, whether the result of

valvular lesions or of alteration of the muscle substance itself, and that in this respect we may consider these diseases collectively. Finally all diseases of the heart of whatever kind are diseases of the muscle substance; even valvular disease, the importance of which has recently been experimentally proved by Romberg, Krehl, His, Rosenbach and others to be due less to the lesion of the valve than to the resulting insufficiency of the cardiac muscle.

On the one hand to compel an inefficient muscle to work *beyond* the limit of its capacity, and on the other daily and systematically to stimulate a muscle to work *up to* the limit of its capacity and to maintain or even to increase this capacity, are two very different things. A superficial consideration might seem to suggest that it is desirable to keep the patient at absolute rest and not permit any extra demands whatever to be made upon the heart; such however is not the case, but an endeavour must rather be made to keep the heart up to its greatest functional capacity and never allow it to go in the least beyond. The subjective sensations of the patient are the surest guide for keeping within these limits when both physician and patient are striving to keep the heart from becoming incompetent by overstrain. It is often possible in this way to increase the heart's activity very considerably. After the development of an acute heart lesion the total strength of the heart may have sunk so considerably and the physiological latitude be so small that the additional demands made upon the heart even by simply trying to raise himself up in bed may cause the patient to faint. Such a patient must be kept altogether in bed till the heart has recovered its strength or compensation has set in; but as soon as the patient is able to raise himself in bed he should daily, very slowly and carefully and under constant supervision, exercise the heart up to the limit of its strength by bodily movements.

Thus he will gradually succeed in doing more and more and may be further helped afterwards by those "exercises against resistance" which are so much used at the present moment. If these "resistance exercises," which should always be given by the physician himself and never by

the aid of a machine, do not exceed the strength of the patient at any time, they are curative, and act in the same way as the other methods sketched above for systematically strengthening the heart. When with much patience and care the heart has in this way been long enough exercised —and " exercise " merely denotes working the organ to the capacity of its function and not exceeding it at any time— then the patient will finally be able to bear without any bad after effects occasional greater demands made upon his heart temporarily, such as are unavoidable in everyday life. If however such excessive demands are made too frequently, especially soon after the heart injury was sustained, or the demands are made regularly and systematically by the medical order of a physician who has taken a wrong view of the condition of the cardiac muscle, then cardiac insufficiency will be developed even earlier than it would have been had such exercise been omitted.

MENTAL REST

A further important part of prophylaxis is mental rest and the prevention of too great an increase of the heart's activity as the result of mental stimuli. It is obvious that this is too complicated to permit us to draw up a simple scheme of rules; the main outlines can alone be sketched and will enable the intelligent physician to form an opinion in any given case and draw up rules for it.

It is well known that mental stimuli excite the heart's action just as do bodily stimuli. Here also, though less obviously, we see the great regulating power possessed by the organism which, acting through the nervous system, adequately increases the heart's movements whenever there is increased metabolism at any part of the body with the object of replacing the used-up material as rapidly as possible. And as it is necessary to limit bodily exercise to the reduced capacity of the cardiac activity in any case, so too it becomes necessary adequately to limit severe mental exertion. The strain of mental exercise acts upon the heart just as physical exercise does, and may act upon the heart to such a degree that, combined with other

unavoidable demands upon it, the limit of the heart's capacity is overstepped. Reading especially should be regulated both in amount and in kind. It is a recreation and diversion in which patients whose heart condition prevents much physical activity are very apt to over-indulge. Sudden emotion, which is another form of mental excitement, must be prevented and guarded against even more carefully than regular and long lasting mental exertion. Patients suffering from heart disease should, so far as it is possible in the imperfect regulation of our human life, be shielded completely from everything that would arouse in them terror, anger, excitement, sorrow or worry. Naturally this is more easily said than done. But much of the harm is caused by the thoughtless unsympathetic friends around the patient, and with great care it is possible to save him from some of this—sometimes from much, sometimes from little. All such mental excitement and depression which act strongly on the organism are as injurious to the heart as sudden very severe physical over exertion, and may disturb for a long time or even permanently a compensation which was previously well maintained. They do harm not only by increasing the heart's activity but also by direct action upon the nervous apparatus of the heart, and as a result they prevent the proper nutrition of the body and of the heart.

In connexion with this regulation of mental excitement there is an important factor to be noted, both in the interest of the patient and of the physician; a factor which under certain circumstances exercises the most injurious action upon the body. This factor is the opinion which the patient has formed and holds about his "heart disease" and the symptoms which it has produced. In regard to this the physician can be of the greatest help to the patient entrusted to his care. We have already pointed out how the individual patient might judge of the amount of bodily exercise of which he is capable, by observing the condition of his heart during exertion and noticing symptoms of palpitation, shortness of breath and increased frequency of the pulse. But patients can only do so

without injurious results when they have been sufficiently instructed and know which symptoms are important and which symptoms have little or no significance. Patients who have heart disease or think they have it anxiously watch every symptom which seems to be connected with the heart's action, and are only too apt to regard the most trivial and natural symptoms as bad and dangerous. The mental effect of this reacting upon the heart is extremely bad. They must be taught that the symptoms are not all of significance. The constant attention which they bestow upon their heart reacts upon the heart through the increased mental activity which it calls forth, and increases the heart's action and constitutes a "vicious circle." So too when attention is given to it palpitation is much more quickly and readily noticed and observed than when such an interest in the subject has not been artificially stimulated. It is very necessary to explain to the patient that it is perfectly normal that he hears distinctly the beating of his heart when he lies in bed at night with one ear to the pillow; and that every one, even one with the soundest and most capable heart, will plainly feel the heart beating whenever he assumes any position in which the heart, from the way in which it is suspended, comes to lie heavily against the chest. The same result may be brought about in the reverse way, when the chest wall is pressed up against the heart by leaning against some firm object or by pressure of the clothes and many similar causes. And other physiological changes in the heart's action must also be explained to the patient. These changes are met with in every one; they remain unobserved and unnoticed by the healthy individual but are readily observed by a patient who has heart disease, and are apt also to be more marked because the diseased heart reacts quickly to slight stimuli: for example the fact that the pulse becomes irregular when the breath is held for long should be mentioned and explained to these excessively anxious and sceptical persons, so that they may know how unimportant this is. And it is only when they are no longer unnecessarily anxious

about cardiac symptoms that mental prophylaxis may be considered adequate.

In order that such mental prophylaxis may be successful the patient must have absolute confidence in the physician. Confidence in the physician is a general and necessary condition for the successful treatment of all diseases, but is probably of greater value in heart disease than in any other. The various signs and symptoms of their cardiac trouble mentally excite such patients, but even greater mental harm is done by the knowledge that their heart is diseased and the conclusions they draw from it. The existence of a cardiac lesion or of heart disease is still generally regarded even by educated people as necessarily leading to the result that the patient is doomed. This opinion is altogether incorrect in the large majority of cases of heart disease if the prophylactic measures described in the preceding pages are carefully and thoroughly carried out. This erroneous opinion produces great depression which reacts unfavourably upon the patient and can only be removed by a physician in whom the patient places the fullest and most immovable confidence.

It is difficult to describe in a book how this is to be done. The physician has to point out again and again, with caution and with gentleness but also with earnestness and emphasis, that a "lesion," a "weakness," is not yet a "disease," and that it is quite possible for a very very long time to get on perfectly well with a heart whose functional activity is reduced, if only the demands made upon this vital organ are not greater than those of which it is capable; and that actual serious disease arises only when prophylactic measures have been neglected and disregarded.

We should be cautious too in the use of such ominous words as "heart lesion" or "fatty heart," because people are apt to attach a very serious meaning to them. When the physician has made a definite and exact diagnosis it is his duty to explain to the patient as fully as is possible what is the condition of the heart. This knowledge will save the patient from all unnecessary fear which an erroneous opinion about his condition might cause him, and will also save him from the anxiety of feeling that he does

not know what things are wrong and injurious for his condition, and it is therefore of the greatest possible prophylactic value against mental distress.

How one will give such explanations and instruction to the individual patient and how much it is well to say will depend entirely upon the character and temperament of the patient. The difficult task of the physician is to distinguish between the characters of different patients, and to paint the disease and its probable course in somewhat dark colours to the thoughtless and indifferent, to point out the possible consequences of neglecting to follow medical advice, and the risks and dangers which such neglect entails. On the other hand he must inspire hope and confidence in the anxious and timid patient, allaying his anxieties and painting the picture in brighter colours. Two results will simultaneously be brought about by such wise treatment of a patient who places implicit confidence in the physician: the patient will carry out carefully the various instructions given him for the prevention of heart disease and will at the same time be carrying out the mental prophylaxis.

OCCUPATION

The choice of an occupation is an important matter when we have to protect the heart from being overstrained by bodily or mental exertion. It is obvious that an individual with valvular disease of the heart or with a heart whose functions are not perfectly normal should avoid every vocation which would necessitate great muscular exertion or much bodily activity. Heavy work of every kind is injurious. An easy sedentary quiet occupation requiring little active exertion should be chosen; and the heart's functional activity must be carefully exercised up to its full limit but never beyond it, by regular walking and other methods already described. In the mode of life (sitting, writing), the dress (uniform) and other conditions everything is to be carefully avoided which by compression would tend to hinder the circulation. These precautions are the more necessary when the heart affection has developed late in life; all severe muscular exertion should at once be

stopped, and though in the majority of cases it is very difficult yet the patient's occupation must be changed and adapted to the new circumstances.

When the heart muscle is affected any lifting of heavy weights and especially any sudden strain must be most carefully avoided. The heart is no longer able to adapt itself to great variations in the demands made upon it, and is most seriously injured by such efforts. It is well known that even moderate overstrain—the running after a tramcar or an effort involving some slight strain or pressure as in defecation—may suffice to stop the heart's action and lead to sudden death.

The same is true of mental excitement. Vocations which involve much mental excitement should be avoided. Here too theory is easier than practice; no vocation is altogether free from mental emotion, but speculating on the stock exchange or lecturing should not be chosen as occupations by one who has heart disease.

MARRIAGE

Marriage is the vocation of the woman. It will remain so however much women may in the future study medicine. Indeed when women have received a thorough scientific training they will recognize that the division of occupation between the two sexes as seen today has developed as the outcome of differences in organization of the two sexes and not through any arbitrary action of the "stronger" sex, and that such differences must therefore always exist. A woman who has heart disease does not thereby become necessarily unfitted for marriage. The opinion of the physician is often asked on this question, and it is by no means always easy to answer. The decision must rest essentially upon the two kinds of excessive demands which will be made upon the heart, namely sexual life and pregnancy which both react upon the heart. There is no doubt that these two factors may in some cases act very injuriously upon the heart, even when the pregnancy runs a normal course and the social conditions of the patient enable every care to be taken.

This is often seen in the course of medical experience. Here again we see, what pathology is so constantly showing us, that the organism can adapt itself to changes of condition which come on slowly and gradually but cannot respond to sudden great changes when its functional activity is no longer perfect, and that one such great sudden overstrain may suffice to cause a permanent injury. In view of the possibility of one or more pregnancies cardiac insufficiency is not a contra-indication to marriage provided the woman is otherwise well developed, and that with proper care fair cardiac compensation is possible. In these cases women may pass through several labours and completely recover. The case is different to that of pulmonary tuberculosis, and C. Gerhardt has recently pointed out most emphatically that pulmonary tuberculosis is always a contra-indication to marriage.

The matter is somewhat different in the case of the sexual excitement which marriage brings with it in greater or less degree according to the temperament and individuality of the partners of the marriage. Here one single excessive demand made upon the heart—in men as well as in women—may be extremely serious, especially when it is oft repeated or is excessive in degree. It is well known that sudden death has not seldom occurred during coitus, because the sexual act so greatly increases the blood pressure that the heart fails. When any one who has a heart affection marries the physician should advise the amount of moderation necessary. This aspect of prophylaxis requires naturally great tact on the part of the physician.

In other cases marriage may sometimes act very favourably upon the heart condition. For not rarely marriage may prove a "haven of rest." When marriage will lead to more stable and better conditions of life, when marriage will bring with it the possibility of better care and better nourishment, then it is to be recommended, though the advantages and disadvantages of the new condition should be very carefully weighed.

INSTITUTIONS FOR THE TREATMENT OF HEART DISEASE

In regard to a suitable abode for those whose hearts require special care the general social conditions are unfortunately such that only a very small number of these patients are in a position which allows them to select the place they would like and that suits them from the point of view of the requirements of their health. However this is not absolutely essential in cases of heart disease, we need only shield such patients from the injurious effects of climate, especially upon the organs of respiration, which would disturb the pulmonary circulation and so disturb and render more difficult the work of the heart. Windy localities must therefore be avoided. It is this that makes elevated localities not well borne by those suffering from heart disease, and probably when the right side of the heart is no longer efficient the rarefied air and low atmospheric pressure of elevated places make the heart's action inadequate. It is best certainly that these patients should spend the hot summer in the mountains not in a town, but a spot of medium elevation should be chosen, for there they feel best. The temperature should be cool rather than warm, because difficult breathing is considerably relieved by a cool or even a cold atmosphere, but obviously great care must be taken to prevent catarrh of the respiratory passages. A southern mild climate is necessary only when there is catarrh or congestion of the lungs. The seaside is also very good and useful as a place of residence. Indeed there are no very precise indications as to climate. All depends upon the individual's power of adapting himself to circumstances. In fact it may be said that any medium climate is suitable and offers a good prospect to one with heart disease.

The most essential point in connexion with heart prophylaxis is the necessity of allowing all possible measures to act for a long time and in combination. This is possible to the fullest extent only by residence at an institution specially adapted for the purpose and fitted up with every-

thing which is required in the prophylaxis of heart disease. The tendency of medicine is more and more to treat special classes of diseases in places where the many different applications and methods which are required can be used simultaneously and to their full extent, and where all the indispensable appliances and helps are at hand. It is only necessary to mention sanatoria for diseases of the lungs, where just as an artist in his studio himself personally carries out every part of his work till it is finished, the physician not only advises as to the measures to be adopted, but watches too the actual carrying out of the treatment, or rather himself carries it out. Faust rightly sets aside the maxim "in the beginning was the word," and replaces it by "in the beginning was the act." So too in the treatment of disease we should endeavour ourselves to do for the patient all that we possibly can, and not rest content with merely giving him advice which will be forgotten or neglected.

The establishment of institutions for the treatment of heart disease is therefore an urgent need for the future. It will be necessary to establish such institutions, not only for the richer members of society, but also for the other classes of the population. These institutions would be of greatest service in the prevention of those injurious effects which result from the improper mode of life of patients who require to be careful because of the condition of the heart. Here the patients would learn how they ought to live, and later on returning home and going back to their vocations would take with them the knowledge which they have acquired of the necessary prophylaxis. This knowledge would not then rest upon verbal instructions and teaching only, but upon previous practice to which they would have become so accustomed that it had set up a habit which they would continue to follow almost unconsciously and involuntarily for the rest of life. A man who has once been a Prussian soldier will have acquired a bearing and a gait and many other bodily actions which he will retain during the rest of his life, and he will unconsciously repeat them in the way in which he

acquired and practised them; so too will a patient who has stayed long enough in an institution for the treatment of heart disease have acquired a habit of prophylaxis which will be of the greatest benefit for the rest of his life.

In the therapeutics of heart disease such an institution would do for all classes of the population even more than what today the various "watering places" do for the few patients who are able to afford to go to them. For example, carbonic acid baths are exceptionally valuable and efficacious in the treatment of heart disease; the reason why we have not described them here is that they belong to therapeutics rather than to prophylaxis. In addition to the baths the many other useful prophylactic measures in force at these places are also of the greatest therapeutic value—all the bodily and mental factors are present, especially the necessary rest and the exclusion of all business matters. In special institutions for diseases of the heart this could all be carried out even more perfectly, and still greater success would result from the treatment of these cases than is possible at the present time in these public "bathing places."

There are numbers of people whose feeble bodies make them unfit for the social conditions in which they live. Government and society should endeavour to provide work and occupation for these of a kind which is suitable for their reduced physical strength. From the standpoint of political economy it is absolutely foolish that hundreds of sufferers from heart disease are employed as masons and locksmiths because no one takes any trouble in the matter. They pass a wearisome existence, their work often interrupted by illness and their life considerably shortened, while many others of great physical strength are employed in such easy occupations as horticulture or office work. How this is to be done is not for me to say, but all our prophylactic and therapeutic measures can only be of permanent good to the individual when their entire mode of life and their work are adapted to their needs, and this is the main factor in all prophylaxis and therapeutics.

First of all there is need for institutions for the treatment of heart disease; and next there is no less need for arrangements and organizations to provide for the patients who leave these institutions conditions of life in which it is at least possible for them to continue the prophylaxis necessary in their case. To establish such institutions is the first essential, to make arrangements for suitable conditions of life for discharged patients whose strength has been improved is the second.

CLOTHING

With regard to the clothing there are two essential conditions for prophylaxis in cases where the heart's functional activity is below the normal. First, it is of the utmost importance to prevent all pressure by the dress. The commonest and most injurious form of such compression is that produced by unsuitable corsets in women; for a patient suffering from heart disease should never wear a corset. Compression acts injuriously in two ways: it may directly interfere with the heart's movements, or it may make the circulation of blood at the more remote parts of the body more difficult. The corset produces both these effects, it directly compresses the lower part of the thorax, and reduces the size of the space required by the heart in its contractions; it forces the diaphragm and liver downwards and compresses the abdomen, and so indirectly obstructs the circulation of the blood. The rest of the dress, whichever part of the body it covers, must also be such as not to constrict or press upon any part; attention is especially to be directed to the collar, waistband and garters. The whole dress, of whatever kind it may be, should be made to cover the body loosely, but nowhere be closely fitting, because even a small amount of pressure is injurious in heart disease. Moreover the dress should be light in weight, made of a supple material to prevent respiration from being made more difficult, particularly during exercise. It is very much a question of the cut and make-up, for the clothes should be so adjusted that they are not felt as a weight on any part of the body.

The second requirement is that the dress of those who have heart disease should be warm, though at the same time not thick or heavy. Excess in warmth must be avoided; and the dress must not be too thick, otherwise it will cause excessive perspiration. These patients must however constantly and continuously be protected against a chilling of the skin, otherwise the cutaneous vessels will contract too greatly and cause increased work for the heart, which might have been avoided by suitable clothing.

FOOD AND DRINK

Food exercises a most important influence upon the course of a disease, and even more upon the strength of the organism and upon its metabolism; this is so universally recognized that we need not enter into further details. While emphasizing this important value of food nevertheless it is not possible to draw up any special rules and dietary for each separate form of disease. In this connection often too little stress or none at all is laid upon the individual conditions of absorption and assimilation in health and in disease. Yet all depends entirely upon this and not upon any "nitrogenous equilibrium," not upon any abstract theories about the relative nutritive values of foods, nor upon the heat value of foods, which have apparently been determined to be necessary under certain conditions, but which are not universally applicable. All these theories omit the fact of the existence of great differences in the power of assimilation of different individuals, and further the conditions under which these experiments have been made were unusual—as Rosenbach well puts it—the conditions are different, and it is quite impossible that the food suitable for a strong working man in full work is that which is required by a patient in a hospital leading a perfectly inactive life. This would indeed imply that the food required by a man engaged in carrying heavy loads is the same as that required by an attendant in a museum.

I have elsewhere referred to this subject in an address in which I drew a not unsuitable analogy from the growth

and development of a child. Obviously for the proper assimilation of food, it is essential that there be a sufficient quantity of food, with its constituents in the proportions and of the nature in which assimilation is quickest and most easy for the organism; but from this it does not follow that the amount absorbed by all is identically the same. If, for example, one were to take six children of the same age, if possible even of the same body weight and so far as possible of the same apparent constitution, and were to feed each on exactly the same amount and kind of food, nevertheless in the course of a short time, though none of them had suffered from any intercurrent disease or unusual circumstance, it would be found that the weights and bodily condition of these six children would all differ considerably one from another. The individual constitutions were different. Such individual constitution is the chief factor in the development of disease; just as the factor which we term the power of resistance may determine whether an infective disease, when the infective matter is present, shall develop or not. So too another very important factor in the constitution is the individual's power of assimilation which determines whether in any given case a certain definite amount of food will maintain the balance and replace loss by metabolism, or whether it will be an insufficient quantity or an excessive quantity of food. However a few valuable guiding principles can be laid down as to the food suitable for patients with heart disease. Omitting for the moment the kind of food and even its total quantity, it is most important to regulate the way in which the food is taken and the amount of food taken at a time. I have described the technique of dietary in Von Leyden's "Textbook on the Therapeutics of Diet," and have laid down the physiological results of the different ways of taking food, and I refer the reader to that work. For patients with heart disease the most essential point is that the food shall be taken in a way which will not increase the work of the heart. As is the case with tight clothes, so here the freedom of action of the heart may be interfered with by a direct limitation of its movements; for when the

stomach is overfilled it reduces the space in which the heart can move in the same way as pressure from without.

The amount of food which may be taken at a time is different in individual cases, and sometimes even a comparatively small amount of food is too much. Patients with heart disease require food often, and only a little at a time, to prevent any over filling of the stomach, and they must be very moderate in the use of food which tends to cause flatulence and in the use of aërated waters.

Another way in which the circulation may be impeded is by food which is difficult of digestion because it is close and hard; the gastric functions may be so greatly increased thereby, as to cause a large flow of blood to the digestive organs and so to increase the work of the heart.

For these reasons stress must be laid upon the necessity of sufficiently masticating food and upon the teeth being in good condition. The patients should always eat leisurely, slowly chewing and swallowing their food. Care must be taken also to vary the food as far as possible; the disinclination of such patients for food, and especially for meat and milk which are so valuable as food, makes it very difficult in practice to supply an adequate amount of food. When hot meat is not taken in sufficient quantity, let cold meat be substituted; there is often less objection to cold meat, and even in ordinary life we can eat larger quantities of cold meat than of hot. When the quantity taken is still insufficient, the meat should be given cut up small or minced. Preserved meats of various kinds may also be very useful as a change, and especially caviare and oysters. Eggs also should be given in every possible form. Patients with heart disease in the stages for which the prophylactic measures mentioned above are most valuable generally take food fairly well; and we must again emphasize the fact that patients with heart disease require to take sufficient good food in addition to observing all the precautions which have been laid down. They must not take any excess of food which only fattens them and produces digestive disturbances—but short of this, they must take sufficient food to repair the wear and tear of the tissues.

In the prophylaxis of heart disease, it is seldom necessary to have recourse exclusively to fluid diet, but if the necessity arises, beeftea and other liquid foods, white of egg dissolved in water, and especially milk, should be given. When ordinary food is eaten the amount of liquid taken must be limited. It is not necessary to go so far as Oertel does and stop all fluids; for when the patient is forbidden to drink at meals, it is often found that he eats much less solid food. All the various "cures" for obesity are based upon one and the same principle, of preventing the patient from eating much; but the methods employed differ. When drinking is forbidden at meals even a healthy person is soon satisfied. Still the fact is undeniable that no drop of fluid leaves the body without having passed through the circulatory system and having thus increased the quantity of fluid in circulation; and if much fluid is quickly ingested the vessels are much overfilled for a time, the blood pressure raised considerably, and the heart burdened with an excessive and injurious amount of work. It is necessary therefore that the patient should take liquids in moderate quantities at a time; and if thus properly divided up, two to three pints a day may very well be allowed, which is the normal quantity also for a healthy person.

It is not a matter of indifference what form of liquid is taken. Milk, broth, cocoa, chocolate, lemonade, the juice of fruits, non-aërated mineral waters, and even light wines may be taken; concentrated forms of alcohol especially when hot, are to be forbidden. Though beer may in some cases be permitted it must not be regarded as a suitable beverage; when it is taken only a little of the lighter form of beer should be permitted, and effervescent beers must be carefully avoided. Tea and coffee if taken at all must be well diluted with milk; the measurement of the cardiac stimulation caused by them will be a guide in special cases. The same holds good for strong wines. They should, as mentioned above, be excluded from the patient's ordinary diet, though they may occasionally be taken with good result, but rather as a drug than as a food.

THE PREVENTION OF DISEASES OF THE HEART

Prophylaxis in heart disease embraces a wide scope and consists of many factors. When all the measures briefly described in the preceding pages are carried out, a patient whose heart has through predisposition or disease undergone some loss of functional activity, may for a long time, often up to the normal limit, live a life which is bearable, and which does not materially deprive him of the enjoyments of life or hinder him from work, provided the latter is of a suitable kind. But medical directions alone, with however great detail given, will but seldom make such adequate prophylaxis possible; in this respect, the most important task which the medical profession and the public authorities have before them is, as was said above, the establishment of sanatoria for persons with heart disease.

The Prevention of the Diseases of the Digestive Organs

BY

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The Prevention of the Diseases of the Digestive Organs

GENERAL SECTION

The prevention of diseases of the digestive organs in many respects coincides with the prophylaxis of other diseases. A rational mode of life, in accordance with the rules of hygiene, is of the greatest importance. To enjoy good health, work and rest must go harmoniously hand in hand. In the civilized world, where work is often of an intellectual nature, it is necessary to see that the body has sufficient exercise. An incorrect mode of life with regard to eating and drinking will often lead to harmful results. Many diseases of the stomach and intestines are caused by improper food, and it is therefore advisable to indicate briefly what should be done.

Meals should whenever it is practicable be taken punctually at regular hours. The time given to a meal should not be too short, and during the meal the body should be completely at rest, physically and mentally, and no thought be given to business matters or other exciting subjects. Some pleasant light conversation is not only permissible but is good. Food should be taken slowly, and well masticated; liquids too must be taken slowly and in moderation. A short interval between the courses is useful.

The number of meals and the kind of food at a meal may best be left to the customs in vogue among the people. It appears to me however to be desirable to point out that a healthy man should not always confine himself to food which is very easy of digestion. On the contrary one should purposely from time to time eat food which

is less easy to digest. Every other organ of the body is strengthened by work, and in the same way the digestive system can only be improved and strengthened by giving it more work to do. People who endeavour always to avoid indigestible food will be more apt to get indigestion by eating it than those would who eat indiscriminately all that is put upon the table.

In health the amount of food taken is efficiently regulated by the feelings of hunger and of satiety, but at a dinner party or other festive gathering the appetite may be so whetted by the dainties that an excessive quantity of food is taken, and one should remember on such occasions not to overburden the stomach. It is advisable to eat only a little of each course, or to omit several courses altogether.

After meals it is well to rest for a short time—a quarter to half an hour. This is specially necessary after the chief meal, and many people are accustomed to take a short nap after dinner. If the sleep is only a short one—not exceeding half an hour—there is no objection to it. But if the sleep is permitted to last one or two hours, it is decidedly bad both for digestion and health.

CONDIMENTS AND STIMULANTS

Condiments and similar substances serve to whet the appetite by stimulating the nerves of taste. Upon the whole they seem to exercise a favourable influence upon digestion. Among these aids to appetite are spices which are added to food, and coffee, tea and alcoholic beverages. Food should be made palatable, but care must be taken not to use too much seasoning, otherwise the digestive organs are soon irritated and disease produced.

Tea and coffee are generally taken with meals or shortly after. The object of both is to counteract the feeling of fatigue and sleepiness which sets in soon after a meal. It is well to add sugar and milk to the coffee, and thus make this beverage also a food. In moderation tea and coffee are not followed by any bad effects, but are useful. If however they are taken in excess, they certainly lead to digestive and to nervous disorders. Restless nights are

often caused by a strong cup of coffee taken late at night. In excess coffee may produce disturbances of the stomach and intestines, and sometimes cause diarrhoea. The excessive use of tea may cause constipation.

In the history of all civilized peoples we find that alcohol was in use. Sometimes it was the juice of the grape, sometimes mead or beer, and sometimes one or other of the many forms of spirit, such as cognac, arrack and rum. The antiquity and the long survival of this custom of taking alcoholic drinks tend to show that they have some use. As is generally known, these drinks act as stimulants. They increase the bodily strength, enliven the mind, and help to produce a feeling of cheerfulness and of well-being. It is also known that all alcoholic beverages taken in excess lead to serious organic disease; it is therefore evident that all excess must be avoided. The more concentrated forms of alcoholic drinks, such as brandy and the heavy wines, seem to be the most injurious. Light table wines and beer less often cause disease. Total abstinence from alcoholic drinks is unnecessary; indeed it is in many respects disadvantageous. In advanced age and in most conditions of exhaustion, alcoholic liquids are regarded as valuable aids for strengthening the body. To prevent the production of diseases by alcohol, these beverages should be taken only in moderation. One should be careful therefore never to exceed a given amount; and it is moreover advisable to drink only at table and occasionally in the evening in company, but not to drink with friends at all hours of the day.

Although this habit of constant drinking should be entirely avoided, it is not necessary to make any absolute rule in the matter. On festive occasions it may be permitted to take somewhat more than usual. Such enjoyments, if only indulged in occasionally and moderately, add to the value of life.

Among the luxuries of modern life must also be reckoned the use of tobacco. Smoking of cigars, cigarettes and pipes should always be in moderation. There is no doubt that smoking in excess brings with it evil results. It causes not

only functional disturbances of the heart, but also digestive troubles. Severe colic and obstinate diarrhœa are often due to abuse of tobacco and cannot be cured until the smoking is discontinued. How much one may smoke without bad results is not easy to determine ; it depends very much upon individual peculiarities. Many men are always smoking, and yet reach old age without feeling any ill effects from their misuse of tobacco. Others again suffer from tobacco poisoning if they smoke two or three light cigars a day. The use of tobacco is a luxury and of no special advantage, and we would therefore counsel growing youths not to accustom themselves to the habit. The pleasure which smoking gives will not be missed by one who has never smoked. Smokers should be advised to smoke only at certain hours in the day, and to use tobacco in moderation. Directly after meals is the best time for smoking. It is hardly necessary to add that light cigars are preferable to strong cigars, because the latter contain a much larger proportion of nicotin. In America the custom of chewing tobacco is very common, especially among the lower classes. By this method the tobacco is brought into close contact with the mucous membrane of the mouth and cheeks, and the nicotin is quickly absorbed, and therefore obviously symptoms of tobacco poisoning appear earlier than after smoking. This is a fact, and it would be a valuable prophylactic measure to do away with this evil custom.

The natural instinct with regard to sexual enjoyment may, in so far as it exists, be satisfied. But excesses lead to general conditions of weakness and to nervous disorders of the digestive apparatus. The golden rule here, as in so many other matters, is the happy medium. Although for the prevention of digestive troubles it would be safer to abstain altogether from many enjoyments, such as drinking and smoking, yet we do not advise absolute prohibition of tobacco and alcohol.

The Prevention of Digestive Disorders in the Course of other Diseases

The rules given above are mainly for prophylaxis against digestive troubles in healthy individuals. It is now necessary to refer to the prevention of gastro-intestinal disorders in the course of other diseases. The first essential in acute diseases should be to take precautions to spare the digestive apparatus. The acute stage is generally of short duration, and no harm will result from restricting the diet for a short time. The diet should be small in amount, and should consist of food which is most easy of digestion, and preferably liquid food. But if the acute illness lasts more than one or two weeks, or if a patient already very weak is attacked by an acute illness, more food must be given earlier, and moreover it should be as easy of digestion as possible. During convalescence after acute illness the change to ordinary food must be made very slowly and cautiously, because after the acute illness the appetite is very keen, and if left to his own inclinations and unwarned the patient is very apt to eat improper food which will set up other troubles in the digestive tract.

A weakened body is always a favourable soil for the development of most pathological conditions, and the foremost and most important task in prophylaxis is to restore strength to the weakened body. This can be done chiefly by a suitable diet, and it will not be superfluous here to state the fundamental principles of dietetics which are so important in relation to those who have been weakened by chronic disease.

Two important facts have been discovered during recent years of the greatest significance in the treatment of patients suffering from gastric trouble, and they have influenced considerably the entire field of dietetics. The first fact discovered (by von Noorden and others) was that the

emaciation in chronic diseases of the stomach is not the result in a large majority of cases (if not in all) of poisons circulating in the blood, but is entirely the result of insufficient ingestion of food. On the other hand, by analogy drawn from animal and vegetable life, where if any one organ is injured or removed some other allied organ takes on the function of the injured organ and vicariously does the work, it seemed probable that when serious disturbance in gastric digestion was present the intestines might do the work instead. That this is a fact has now been experimentally and clinically proved; several observers (Leube, Ewald and von Noorden) have made observations and found that in cases of atrophy of the gastric mucous membrane where the gastric secretion has completely ceased, patients may nevertheless keep up their weight. My own work on achylia gastrica, that is absence of gastric secretion, shows that these patients can get on perfectly well without gastric juice; indeed if they follow a suitable plan they may even increase in weight and live the full limit of life without suffering any trouble: that is to say when the chemical functions of the stomach are entirely lost, the intestines may completely carry out these functions.

These two facts—(1) that the emaciation in chronic gastric disease rests upon insufficient ingestion of food, and (2) that even in serious disorders of the gastric functions the intestines may act vicariously and perform all the work of digestion—are of fundamental importance in dietetics. It is therefore evident that the chief aim in the feeding of patients must be to give them a sufficient quantity of food.

As the substances needed to maintain life in patients suffering from digestive troubles are not less in amount than those required under normal conditions, they will probably require to take (1) as large a quantity of food, (2) the same kinds of food, as under normal conditions. The only possible difference will be the choice among the variety of foods and the choice as to the form and preparation of the food.

The digestibility of a food depends, firstly upon its form and consistence, secondly upon the amount of nutritive

matter which it contains. "Corpora non agunt nisi fluida," is an old axiom, and the following table of foods, drawn up mainly according to their conditions as liquids or solids, ranges the foods according to their digestibility.

1. Most digestible are foods in the fluid form—either (*a*) fluids: milk, meat juice, broth, beef extracts, solutions of peptones, toast water, mucilaginous decoctions, rice water, oyster soup, solutions of white of egg; (*b*) substances which become liquid at the temperature of the body: jellies, fruit jellies, ice cream, fruit ices.

2. Broths: foods cut up very small and well cooked in water; soup in the form of broth (barley soup, oatmeal, semolina, rice, sago), egg soup, Leube's meat essence, pounded meat, powdered biscuits in milk, water or broth, koumiss, skim milk, cream and butter.

3. Foods which are easily broken up by stirring in water: white bread in milk or water, the tops of well-cooked asparagus, carrots, mashed potatoes, baked potatoes, hard boiled yolk of egg, and oysters.

4. Solid foods: white bread, rye bread, meat, hard-boiled eggs, fish and cheese.

5. Substances very difficult of digestion: meat of coarse fibre, lobsters, sausages, and Swiss cheese. All substances containing much cellulose, especially when they are eaten raw: vegetables, salads, cucumbers. Uncooked fruits: apples, pears, pineapples. Fruits containing much acid, namely, all unripe fruits, strawberries. Substances which contain much sulphur, and thus tend to cause flatulence: all forms of cabbage, especially white cabbage, beans.

This list is arranged on theoretical principles, and for the most part accords with the opinion founded on experience, and by this experience I am generally guided.

To prevent insufficient food being taken by the patient, it is best not to forbid any food except such as we know to be directly injurious to the patient, and to let the patient have a large variety of food.

With regard to the number of meals and the times for meals, it is best not to make any change unless there is some special indication for it.

There are many prejudices against certain foods, both among the public and among medical men. For example fat and butter were formerly strictly forbidden in all dyspeptic conditions. But fat is one of the food-stuffs which possesses the greatest value as a heat-producer, and butter moreover is not a bulky form of food. Fat which is not rank passes through the stomach without affecting it at all, and is digested in the intestine; there is therefore no ground for withholding butter, and indeed it should be strongly recommended. Bread and other carbohydrate food is often forbidden or its use restricted for fear that it will cause fermentation. Even though it be true that carbohydrates readily give rise to fermentation, yet the cases in which much fermentation occurs in the stomach are fairly rare, and it only occurs when food is delayed in the stomach for a very considerable time. The adult consumes daily, according to König, $\frac{3}{4}$ pound to $1\frac{1}{2}$ pounds of bread, and 50 to 60 per cent. of his total food and 50 to 75 per cent. of his carbohydrate food is taken in the form of bread. This shows plainly how valuable bread is, and the use of it should generally be recommended. It is usually said that bread crust, stale bread and biscuits are more easily digested because a larger proportion of the starchy material they contain has been converted into dextrose. Although I think that new bread should be avoided, yet I seldom find any great difference in the ease with which patients digest crust and the other parts of well-baked white bread.

The use of stimulants, such as wine, beer, coffee and tea, may generally be permitted as occasion necessitates, but they must be taken in moderation and in a suitable form. Strong spirits and spices should be avoided.

Substances to promote appetite are beneficial, especially if directly indicated; a little caviare, some sardines or anchovies can be given with bread or a biscuit a quarter of an hour before a meal time.

These principles are applicable to all cases of chronic disease, whether of the digestive system or of any other organ, as in tuberculosis, in diseases of the heart, kidney, liver or spinal cord.

The Prevention of Diseases of the Stomach

GASTRIC CATARRH

Acute gastric catarrh may be best prevented by avoiding errors in diet, such as overloading the stomach, ingestion of improperly cooked or decomposed food and ice-cold drinks. Eating too quickly and swallowing large unmasticated pieces of food should also be carefully avoided.

Chronic gastric catarrh may be best prevented by carefully treating acute gastric catarrh, and not allowing it to pass into a chronic condition; and by avoiding everything which tends to cause chronic gastric catarrh. One should not eat too quickly, should well masticate the food before it is swallowed, and not overload the stomach with large quantities of food. Highly seasoned dishes and ice-cold drinks irritate the stomach and may produce a catarrhal condition. Iced water and eating too fast are the two chief causes of the so-called "American dyspepsia." Tea and coffee taken in excess can also give rise to chronic gastric catarrh. Alcoholic drinks, especially the stronger kinds, such as whisky, liqueurs, and "bitters," and the excessive use of tobacco, by smoking and more particularly by chewing, may also cause gastric catarrh.

In addition to suitable dieting, the patient should lead a rational healthy life. Business hours should not be too long; and sufficient bodily exercise should be taken. Walking or driving, riding, cycling and rowing should be strongly recommended; but care must be taken not to overstrain the body. Gymnastic exercises at home are also useful, say for ten minutes every morning. A cold bath in the morning, and thorough friction with a thick rough towel are valuable. Moreover the patient should live in well ventilated rooms, and be forbidden to stay long in smoky places and restaurants.

GASTRIC ULCER

Von Sohlern has pointed out that in many districts where the inhabitants' diet consists chiefly of vegetables gastric ulcer is unknown. A vegetable diet is very rich in potassium salts, for it contains about a third more than does a mixed diet; and as the red blood corpuscles are the chief carriers of potassium, Von Sohlern thinks that the greater amount of potassium salts in their food confers immunity against gastric ulcer on the inhabitants of these districts. For these theoretical reasons, Von Sohlern recommends the administration of potassium salts and of foods rich in vegetable substances as a prophylactic against gastric ulcer.

Certain occupations greatly predispose to ulcer of the stomach, and in cases of gastric ulcer these occupations should be avoided. Cooks often suffer from gastric ulcer, and the tasting of very hot food has often been thought to be the cause. Cooks should therefore be cautioned and advised to let the food cool before they taste it. Shoemakers are said often to suffer from gastric ulcer, most probably from the bent position of the body assumed in their occupation. It is advisable therefore to hold the body as upright as possible when at work.

Chlorosis and anaemia are important factors in the causation of gastric ulcers, and it is therefore important to treat these disorders at the very beginning, and remove the condition favouring the development of gastric ulcer. Excess of hydrochloric acid is very often met with in gastric ulcer, and it is highly probable that this is favourable to the development of an ulcer. This excessive formation of hydrochloric acid therefore should be treated.

Gastric ulcer is often accompanied by serious complications, haematemesis and perforation being the most dangerous. It seems desirable here to say a few words with regard to the prevention of these. A strict diet is of first importance, it should be liquid or semi liquid, and all indigestible and highly seasoned food should be avoided; and next in importance is the avoidance of severe bodily

movements, such as riding and golf. When the haemorrhage is of frequent occurrence, it may be advisable to think of performing a gastro-enterostomy in order that the gastric contents may more rapidly be passed on into the intestine, and the surface of the ulcer be thus to some extent relieved from irritation. This operation is often of great value in preventing recurrence of haemorrhage, and moreover it may lead directly in some cases to recovery.

EROSIONS OF THE STOMACH

In a large number of cases of erosion of the stomach, a chronic catarrh coexists and seems to be the cause of the erosion. The prophylactic measures which are best for preventing erosions are those which prevent the chronic gastric catarrh.

CARCINOMA OF THE STOMACH

The cause of cancer is not yet known, it is therefore scarcely possible to state how it may be prevented. We can merely name a few of the factors which are said to play a part in the aetiology of cancer, and say how they are possibly to be avoided. Some accident was formerly regarded as definitely a cause of the development of cancer of the stomach. Of late this opinion has been much emphasized by Boas. It is advisable therefore that all blows upon the abdomen be avoided. During recent years many authorities have stated that cancer is more frequent among the upper classes, who live well and eat much meat, than among the poorer classes. If such be the case, care should be taken to live less luxuriously and to eat less meat. According to Eichorst and Cloquet the frequent consumption of cider and of sour wines is said to favour the development of cancer. Another matter should also receive attention. As Rosenheim has shown that cancer sometimes develops upon the site of an ulcer, it is advisable that every effort should be made to heal an ulcer, in order to prevent the formation of a cancer.

HYPERCHLORHYDRIA AND HYPERSECRETION

Sorrow and anxiety and mental overwork must be strictly forbidden. All highly seasoned food, strong alcoholic beverages and iced water must be avoided. These causes all contribute greatly to the development of hyperchlorhydria, that is the excessive formation of hydrochloric acid, and hypersecretion. When hyperchlorhydria is already present, every possible means should be taken to prevent the disorder from getting worse. The daily life of the patient must then be regulated with reference to the amount of work he does, bodily exercise, mental rest and amusements. What suits one does not suit another, and it is therefore necessary to treat each patient individually. Business men upon whom great responsibilities rest, lawyers, politicians and physicians must be taken away from their work and sent into the country in order to allow the brain to rest from the strain for a time. Ladies in high circles of society who frequent all social functions must adopt a quiet life. There are others again possessing much property and having no occupation who get ill merely because they devote too much attention to their bodily functions, and it becomes necessary to find some mental occupation for them. Sponging the body all over with cold water every morning, and bodily exercise for about eight or ten minutes on rising are valuable in most cases. The patient should be advised to take a walk once or twice a day for half to one hour, or to ride, drive, or cycle.

ACHYLIA GASTRICA

Gastric atrophy can only rarely be prevented. Chronic gastric catarrh which has existed a long time passes into atrophy. Careful treatment of the gastric catarrh is therefore often serviceable as a prophylactic against the development of atrophy. General nervous conditions must be carefully treated by the usual measures, so that these predisposing conditions for atrophy may be removed. There are however cases in which gastric atrophy has existed

so long that we have to look upon it as a congenital abnormality. In such cases no prophylaxis is possible.

DILATATION OF THE STOMACH

Acute dilatation of the stomach can be prevented by avoiding all errors in diet and overloading of the stomach.

Chronic dilatation of the stomach may result from various causes: (1) stenosis of the pylorus; (2) hypertrophy of the pylorus; (3) distention and muscular weakness of the stomach. Stenosis of the pylorus may be caused by non-malignant as well as by malignant new growths. Prevention of stenosis of the pylorus can have reference only to the non-malignant forms, and these are for the most part due to the development of scar tissue after an ulcer has healed For these reasons the ulcerative process must be very carefully treated while still recent, and treatment should be continued till the ulcer has permanently healed. As soon as there are symptoms of a commencing ulcer a fluid diet must be adopted and continued for a long time, in order to prevent any severe irritation of the spot. The region around the ulcer near the pylorus, which becomes irritated and inflamed, will thereby be more easily restored to its normal condition. The cause of simple hypertrophy of the pylorus is not yet understood, and its prophylaxis is therefore impossible. Prophylaxis of malignant stenosis of the pylorus is similar to that for cancer of the stomach. To prevent dilatation of the stomach from weakness of the muscular wall, all atonic conditions of the stomach must be treated early by electricity, massage, and general gymnastics, and by proper diet. The imbibition of large quantities of fluid should also be avoided.

TETANY

Tetany is occasionally a complication of dilatation of the stomach. It can only be prevented by not permitting food to accumulate in the stomach. This is best done by giving liquid food, by washing out the stomach, and by administering drugs which check fermentation. Bouveret

and Devic have shown that when much alcohol is taken more toxic products are formed in the stomach in the presence of hydrochloric acid; and it is therefore obvious that to prevent tetany alcohol must be forbidden.

ENTEROPTOSIS

Much may be done to prevent enteroptosis. In a large number of cases it is the result of mechanical action. Compression of the lower part of the thorax and of the upper half of the abdomen pushes the organs downwards. It is of the utmost importance that women should not wear corsets, or at least that the corsets should be loose. Tight clothes round the waist must also be avoided. Enteroptosis may also arise from rapid changes in the contents of the abdomen, as after childbirth or the removal of large abdominal tumours. In these cases there is a sudden lowering of abdominal pressure, and organs which have occupied a higher position slip down to fill the empty space. The best means of preventing enteroptosis in all these cases are rest in bed for several weeks, and the use of suitable abdominal belts to keep the abdominal walls in position and reduce the size of the abdomen. Enteroptosis may be caused also by great emaciation and inanition; and attempts should be made to prevent it by administering nutritive food. It is also important to strengthen the abdominal muscles by gymnastic exercises.

NERVOUS AFFECTIONS OF THE STOMACH

Excessive mental exertion, grief, unusual excitement and sexual excesses are the chief causes of neuroses of the stomach. These points should all receive attention. Several neuroses of the stomach continue or become worse by constant repetition, for example nervous eructations, regurgitation, rumination and nervous vomiting. In such cases it is important to get the patient to suppress the desire to bring up gases and food. Habit plays a great part in prophylaxis, and whenever there is a tendency to these disorders the patient should be properly

instructed what to do. In neuroses affecting other organs, general treatment is required to prevent the development of any neurosis of the stomach.

The Prevention of Diseases of the Intestine

ACUTE AND CHRONIC INTESTINAL CATARRH

To prevent acute intestinal catarrh the following rules must be observed.

1. One must carefully avoid heavy indigestible food, ice-cold drinks, tainted meat or fish, unripe fruit, stale or sour beer, and bad water.

2. Excessive ingestion of food and drink, even though wholesome, must also be forbidden.

3. Many organic and inorganic substances which chemically irritate the intestinal mucous membrane and cause inflammation must be prescribed as seldom as possible: such are the drastic purgatives like croton oil, colocynth and jalap; and among inorganic substances, tartar emetic, arsenic, lead, copper sulphate, all preparations of mercury, concentrated acids and strong caustic alkalies.

4. Mechanical irritation by faecal masses, gallstones, enteroliths; or foreign bodies which have been swallowed, as large fruit stones and coins, may cause inflammation.

5. Influences of temperature: the susceptibility to changes of temperature seems to be very different in different individuals. Some people get diarrhoea if they sleep in summer without much bedclothes and the temperature happens to fall; others by getting their feet wet.

Chronic intestinal catarrh arises either out of a severe acute enteritis which has not perfectly subsided, or after repeated attacks of acute enteritis in rapid succession and before the intestine has had an opportunity of recovering completely. This often occurs in patients who take but little notice of an apparently trivial affection and do

not carry out the physician's instructions about diet. The direct causes are similar to those of acute enteritis. For prophylaxis it is therefore necessary to take the precautions required to prevent acute intestinal catarrh, and moreover to treat an acute intestinal catarrh carefully and thoroughly and prevent relapse. In regard to this the following is important: the patient should wear warm clothing, especially over the abdomen (flannel belt) and on the feet, and take care not to get wet feet; in rainy weather shoes with thick soles or goloshes should be worn. When there is diarrhoea, we must forbid acid and sweet wines, all aërated mineral waters, lemonade, all fruits, salads, all kinds of cabbage and cauliflower, and brown bread and pastry. Instead of these we should give only eggs (lightly boiled or beaten up), tender meat, calf's brain, chicken, lamb cutlets, oysters, light fish, well baked white bread or toast, fresh butter, and mucilaginous soups, meat broth, rice, sago, macaroni, mashed potatoes or baked potatoes, milk, cocoa, tea, koumiss, ginger ale, good red wine, or tokay.

All food must be taken only in small quantities at a time; drinks should be warm or cool (at the temperature of the room), but not cold. When there is a tendency to constipation, light fruits may be taken, such as oranges, grapes, or ripe pears, green vegetables, green peas and cauliflower. The addition of more nutritive foods, easily assimilated fat, butter, cream and liquids will be useful. Indigestible food, such as brown bread, German sausage, lobster salad, mayonnaise, cabbage and cucumber should be avoided. Beer, porter, or Rhine wine in moderate quantities may be allowed.

DYSENTERY

It is best to keep away from those latitudes where dysentery is endemic. In epidemics care should be taken to regulate the life according to the best hygienic principles. Food should be taken regularly, as hunger or want of food predisposes to this disease. Recent investigations show that most cases of dysentery are caused by invasion of the

body by amaeboe. The latter enter the body mainly with the food or drink, and scrupulous care should therefore be taken that the food and liquids taken are absolutely free from contamination. The food should be eaten boiled or roasted, and the water filtered and afterwards boiled. Raw fruit and salad should be omitted from the dietary. Care must be observed that the evacuations of dysenteric patients do not contaminate anything, or very thorough disinfection should be employed.

INTESTINAL ULCERS

It will scarcely be possible to prevent duodenal ulcers. Upon the whole the indications for prophylactic treatment are similar to those for gastric ulcer. After extensive burns duodenal ulcers are apt to form, and it is therefore necessary to keep the burnt surface carefully dressed and as aseptic as possible.

Tuberculous ulcers in the intestine may be primary or secondary. To prevent primary ulcers care must be taken that the flesh of tuberculous animals is not eaten, nor the milk from tuberculous cows. It is difficult to ascertain whether the milk is from a healthy or tuberculous cow, and it is therefore very advisable to boil the milk regularly before use. Secondary tuberculous ulcers occur in phthiscal patients and are generally caused by sputum which is swallowed and so infects the bowel. Phthisical patients should therefore be directed never to swallow their sputum but always to expectorate it.

Syphilitic ulceration of the intestines is best prevented by thorough treatment with mercury directly the first signs of syphilis appear.

Very little can be done to prevent lardaceous disease of the bowel. Conditions of malnutrition should be avoided.

NEW GROWTHS OF THE INTESTINES

New growths both malignant and benign in the intestine cannot be prevented, because we are at present completely in the dark as to the aetiology of these tumours.

HAEMORRHOIDS

All conditions which lead to permanent hyperaemia of the lower part of the rectum tend to cause haemorrhoids. These points should be carefully noted. Occupations which necessitate prolonged sitting or standing should be avoided. Clerks, students, shoemakers, tailors, cavalrymen, needlewomen and washerwomen must take especial care against haemorrhoids. Those who live well and those who take highly spiced and fatty food suffer from congestion of the portal circulation and thus are predisposed to haemorrhoids; such patients should adopt a simpler, more suitable mode of life. Habitual constipation and the use of strong purgatives, such as aloes, colocynth, or gamboge, are a frequent cause of haemorrhoids, and this must be borne in mind in prophylaxis. Patients who are predisposed to haemorrhoids should observe the following rules: they should take plenty of exercise in the open air, eat little, avoid alcoholic or venereal excess, and see that the bowels are daily evacuated. If there is any tendency to constipation the following purgatives are useful—salines, sulphur, or rhubarb: for example a teaspoonful of the compound powder of liquorice every evening, or a teaspoonful of equal parts of flowers of sulphur and cream of tartar. Rhubarb in the form of the tincture or as a powder, ten to fifteen grains twice daily, is useful for more constant use. The waters of Karlsbad, Kissingen, Marienbad, Tarasp and Saratoga are also of use, more especially when taken at these springs in combination with a suitable diet. With regard to the diet the following points should be observed: full meals should be avoided, and food taken more often but little at a time. Fish, well cooked fresh vegetables and ripe fruit should compose the main bulk of the food. Alcoholic drinks, strong coffee and highly spiced dishes should be avoided. The various kinds of cheese, very coarse brown bread, cabbage, peas and beans are best omitted. Salad, potatoes, carrots, spinach, asparagus and cauliflower are permissible in small quantities because they make the intestinal contents more liquid; boiled and raw fruit, such as apples, pears, plums,

oranges and grapes are useful. For a beverage water is best, taken between meals, rather less than a pint at a time. In some cases, especially in anaemic conditions, a little skimmed milk may be given instead of water. A small quantity of light beer may be permitted.

APPENDICITIS

Formerly, as a prophylactic, one forbade the swallowing of fruit stones, pieces of bone, and portions of indigestible food, but now we know that these play no part whatever in the production of appendicitis. Regulation of the bowels and removal of constipation were also regarded as important prophylactic measures, but recent investigations show that this is not so. Regulation of the bowels is important and to be recommended, but the only means we possess of preventing appendicitis is to remove the appendix. This cannot be recommended in all cases, because the operation is not quite free from danger, but it may always be undertaken when a laparotomy is necessary for some other reason and when it does not take too long.

INTESTINAL OBSTRUCTION

Prophylactic measures against acute intestinal obstruction are only possible in the sense that all conditions should be avoided which tend to produce it. We should take care that all herniae are radically cured or a suitable truss applied. If gallstones are present, purgatives should be used to prevent the gallstone from becoming impacted and causing obstruction. In severe chronic constipation intestinal obstruction may result from the occlusion of the lumen of the intestine by hard faecal masses. In these cases care should be taken not to let constipation exist for long, and to soften the faecal masses if they have become hard. In constriction of the intestines, acute intestinal obstruction must be avoided. For such cases mild aperients should be often used, and all food should be avoided which gives rise to much faecal matter or which irritates the intestine. Thus, green vegetables, salad, fruit, vinegar, mustard and pepper should be strictly forbidden; but the patient may take milk, milk

soups, eggs, tender meat without much fat and without any gristle, butter, toast, or well baked white bread, gruel, rice, or sago, well cooked. Patients should eat frequently and not too much at a time. Cold drinks should be avoided. Care must be taken to give sufficient food.

DIARRHOEA

Diarrhoea is either a symptom of intestinal catarrh, or is associated with abnormalities of the functions of the stomach, or is an independent purely nervous affection. Prophylaxis of intestinal catarrh has already been described, and we need only refer here to the two latter forms. To prevent diarrhoea which occurs in connexion with abnormal conditions of the stomach—"dyspeptic diarrhoea"—the abnormal condition of the stomach must be treated as soon as it is diagnosed, and every available means taken to correct it. To prevent nervous diarrhoea, it is necessary by the usual means to strengthen the nervous system of all who are predisposed to neurasthenia or to any nervous disease.

Bromides, iron and arsenic will often be needed. A sufficient amount of food must be taken and of great variety, and the bowels must be made to act regularly. After the bowels have acted in the morning, the patient should not allow them to act again unless it is absolutely unavoidable. Any slight desire to defaecate should be suppressed.

CONSTIPATION

Habitual constipation is in many cases caused by repeatedly neglecting the calls of nature. Young girls at school suppress the desire to defaecate from a sense of false modesty, and this leads to irregularity in the action of the bowels and afterwards to constipation. Great punctuality should be observed with regard to this act. The exhibition of purgatives for slight temporary digestive disturbances should be avoided and nature should be allowed to act. A patient should never be too long restricted to an exclusive diet; exclusion of vegetables, fruit and of carbobydrates from the diet often leads to marked constipation. An hygienic mode of life, regular habits, less strain from work,

less worry and more fresh air and out-of-door exercise are of the greatest value in preventing constipation. As a rule I give very little or no aperients. When there is a tendency to slight constipation the following measures will be found to be best: one should drink simple cold water upon an empty stomach, or skimmed milk, take grapes, oranges, and other fruit, raw or cooked, such as apples, plums, pears and peaches, lemonade, honey, salmon, sardines, herrings, plenty of vegetables, spinach, green peas, cauliflower, cabbage, salad, rye bread and butter. One should avoid strong tea, red wines, bilberries, cocoa and chocolate.

METEORISM OR FLATULENCE

This affection, when not produced by some organic obstruction in the intestine, is caused by some anomaly in peristalsis and absorption. For the former cause hardly anything can be done in the way of prophylaxis. For the latter two causes the following points should be observed: one should avoid taking much gas, as in aërated waters or substances which give rise to much formation of gas, such as cabbage, beans and peas, and large quantities of carbohydrates. Care should be taken that the bowels act regularly, and any slight tension in the abdomen should be relieved by a mild aperient.

INTESTINAL PARASITES

For the prevention of infection by intestinal parasites the following measures are of importance: (1) The hands should be kept very clean. If soiled with any faecal matter, and after touching domestic animals, the hands should be carefully washed and possibly a disinfectant used. (2) All meat and vegetables should be well cooked, or exposed to a sufficiently high temperature. All fruits and salads should be thoroughly washed before being put on the table. (3) Drinking water should be filtered and boiled. (4) Navvies and brickmakers should wash their hands thoroughly before meals and on leaving work.

Prophylaxis in Surgery

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The following pages are a presentment of one aspect of hygiene, indeed a kind of clinical hygiene. In reality, every method of treatment is preventive, since from the moment that the patient comes into our hands for treatment, we endeavour to prevent further mischief, and to remove the mischief which already exists. In the special department of surgery, however, there is, if one may say so, a special prophylactic treatment. In every case we are obliged, whenever it is at all possible, to act conservatively; and when the conservatism is not possible and operation is inevitable, we remove as little as possible and adopt the safest course and method we can. All the great results of modern surgery are the outcome of prophylactic measures. By anaesthesia we prevent the patient feeling pain and cause relaxation of the muscles; by Esmarch's method of depriving a part of its blood supply, haemorrhage is reduced to a minimum, and by aseptic or antiseptic treatment of wounds we guard our patients against the risk of infection. In other ways too preventive treatment plays an important rôle in surgery, and we cannot too strongly urge the surgeon to perfect himself in prophylaxis. From how much trouble, for instance, he can save a patient if he treats a fracture rightly from the very beginning; and how much trouble will be caused, not only to the patient himself, but also to the doctor and the accident insurance company, when the injured part has not healed properly. Such accidents and their results have proved to us how much formerly was lacking in the treatment and especially in the after treatment of such injuries,

and how much better able we are now to treat these cases correctly from the very beginning.

We have endeavoured in the following pages to expound the general principles according to which preventive treatment in the various departments of surgery should be carried out.

A. General Prophylaxis

I. PREVENTIVE MEASURES IN THE PERFORMANCE OF OPERATIONS

The report of Heimann shows that 559,576 patients were treated in the various hospitals of Prussia during the year 1894; and that 58,988 patients out of this total number underwent serious operations. He calculates that twelve per cent. of the total number of deaths occurring in hospitals were after operations. These figures warn us that in spite of all advances in antisepsis and asepis, and in spite of all improvements recently introduced to minimize the risks of anaesthesia, we should in every case consider very carefully whether all the indications for the operation are present, and we should constantly keep before our minds the dangers to which we expose our patients in major operations. The nature of the dangers is twofold, sometimes arising from threatened infection, at other times from the anaesthetic itself. One of the noblest aims of the surgeon is to relieve pain, and we can readily understand the enthusiasm aroused by the introduction of anaesthesia, as described by Diffenbach in his book, "Ether, a Preventive of Pain." Yet this must not blind us to the great moral responsibility which we take upon us when we give anaesthetics.

What then are the dangers of anaesthesia, especially of chloroform anaesthesia (that anaesthetic being still most frequently used in Germany) and how can we prevent these risks as far as possible?

Every time an anaesthetic is given we should be on the lookout for acute chloroform-asphyxia with its manifold symptoms, and next we must guard against its after effects. As to the latter, the researches of Fraenkel, Kindskopf and

others have shown that degenerative changes are produced in various organs, especially in the kidneys and heart, by the toxic action of chloroform. In patients with renal or cardiac disease chloroform must be administered with the greatest caution, or some other anaesthetic must be substituted for it. We see how important it is to examine thoroughly the patient before giving him an anaesthetic; for the right choice of an anaesthetic depends chiefly upon a previous careful examination of the heart, the lungs and the kidneys: in this way only can we hope to reduce the risks of anaesthesia. Valuable though chloroform is, yet we should always regard it as a poison, and should administer the smallest quantity possible.

During the last few years certain rules have been drawn up to remove the direct dangers of chloroform narcosis, and though it is impossible to remove all the dangers, yet they are considerably lessened when these rules are carefully followed.

It is self evident that the anaesthetist should be a qualified medical man, and this is expressly required by law. This regulation is unfortunately not always obeyed in hospitals, and the responsibility of giving an anaesthetic is entrusted to nurses, though it is a duty which only a doctor can rightly perform. The custom which is said to obtain in England of allowing unqualified persons to give chloroform, we consider most reprehensible.

The various stages of narcosis will now be considered, and the possible dangers which may supervene. It is absolutely necessary, when circumstances permit, that the patient should be prepared for the anaesthetic by emptying the stomach and intestines. For some hours before the anaesthetic is given the patient should have no food, and the bowels should be emptied by a purgative, followed if necessary by an enema. These measures suffice in many cases to remove the tendency to vomiting. After having had a warm bath, the patient is placed upon the operating table, which should be in a warm room (68° to 75° F. according to the nature of the operation), as it has been proved that there is always loss of body-heat after pro-

longed anaesthesia. Gas-jets should be avoided in order to prevent the formation of products, especially of chlorine compounds, which affect injuriously the respiratory organs. The patient should be placed in the horizontal position. The anaesthetist should ascertain that the patient has no foreign body such as artificial teeth in his mouth, and then the mask should be applied, but so as to admit free access of air. It is most essential to use as little chloroform as possible when beginning to induce narcosis, and the drop method now so universally employed is best. The chloroform should be absolutely pure and kept in a small brown stoppered bottle to protect it from light and air, and should be given by the drop method, about twenty to forty drops per minute being used.

One of the first symptoms which may appear is the so-called "stage of excitement" in those who have been addicted to alcohol. To prevent or diminish this, it is best to give one or two wineglasses of good brandy a quarter of an hour before the anaesthetic. Injections of morphia are often used to prevent this stage of excitement, but the after effects may be very bad, and we do not therefore recommend its use; alchohol however seems to improve the action of the heart. It is often reported that sudden fatal syncope has occurred at the very beginning of anaesthesia when the patient had had only a few whiffs. Personally we believe that these cannot all be ascribed to the action of the chloroform, but that a large number of these deaths are due to shock through fear or some other nervous disturbance in a sensitive patient. Once we had a death upon the operation table of a patient who had a small empyema, and who died at the moment when the inhaler was about to be placed over his face, and before he had inhaled any chloroform vapour.

We do not deny that cases of true cardiac syncope occur very suddenly even after very small doses of chloroform, and that in many cases we are powerless to prevent it, but it seems to us that such cases are not very numerous. These cases should warn us to watch the pulse and respiration very carefully from the very commencement of giving the

anaesthetic, and we must here speak against the erroneous opinion that the heart ceases to act only after cessation of the respiration, and that it is sufficient therefore to watch the respiration only. The pulse must be watched from the beginning, and at the same time observation of the respiration must not be omitted.

Deep anaesthesia is recognized by the complete absence of the corneal and conjunctival reflexes and by diminution in the size of the pupils, which at the commencement of anaesthesia undergo some dilatation. The deeper the narcosis at the commencement of the operation, the less chloroform will be required for prolonged operations. But this is the moment when the anaesthetist cannot be too cautious, and when he must give his full attention to the slightest change noticed in the patient, even in the colour of the skin. If the pulse gets worse or ceases altogether, the operation must be interrupted and attempts must be made to restore the action of the heart. One should see that the respiratory tract is free, and should push forward the lower jaw, or still better, should draw forward the tongue and apply massage to the heart by the Koenig-Maass method. In this way it has often been possible to bring the patient back to life, though the heart has ceased to beat for some time.

As to respiratory difficulties, it is always possible to remove these; indeed, it is generally possible in cases of cardiac syncope which end fatally to keep the respiration going artificially for some time after the heart has ceased to beat. Above all we must keep the respiratory tract free from any obstruction. Among the various methods of artificial respiration Schüller's is the best. In this method the right and left arches of the ribs are grasped one in each hand, and are forcibly drawn upwards and outwards, and then pressed downwards again towards the abdominal cavity. At the same time the tongue is drawn forward, which may be done with least injury by pointed bullet forceps; the upper opening of the larynx must first have been cleared of mucus. By observing these principal precautions we shall be able to reduce the number of deaths from chloroform, a considerable number of which still occur. According

to Gurlt's statistics of 330,429 cases of chloroform anaesthesis, there was one death from chloroform to every 2,075 cases. The future will show whether it is possible to avoid all chloroform fatalities. But deaths will only be prevented if the anaesthetist gives his undivided attention to his important task; so many cases which are in great part, we think, due to the carelessness of the anaesthetist, may then be prevented. But the main point is that only a medical man should administer chloroform.

After what has been said we shall not be surprised that in recent years the oldest anaesthetic, namely ether, has come again to the front as a powerful competitor of chloroform. Gurlt's statistics of 1893 showed that only one case of death was recorded in about 15,000 cases of anaesthesia by ether; but in last year's report the proportion of deaths to cases was 1 to 5,112, now that we are acquainted also with the indirect effects of ether. Ether has an unfavourable effect upon the respiratory passages, and among its after effects is pneumonia, which in weakly patients readily proves fatal. The great advantage of ether over chloroform is that the danger to the heart appears to be far less, and it is the unexpected sudden failure of the heart which we have chiefly to fear with chloroform, and which we are quite unable to prevent. An unpleasant symptom of ether is the secretion of a large amount of saliva and mucus, and this leads to unpleasant respiratory difficulties much more frequently than when chloroform is used, and the employment of ether in phthisical patients, in catarrh of the respiratory passages, and in the young, seems contra-indicated. The question as to which anaesthetic is the least dangerous when we consider also the after effects is not yet settled, and will probably not be settled for many years to come, and meanwhile we shall still be obliged to use both. On the whole we can confirm the opinion of Kümmell, who writes, "In the present state of our knowledge we should use ether only in cases with heart disease, in those who are very weak, and when during anaesthesia conditions of weakness become apparent." One great drawback in our present method of anaesthesia must still be mentioned: we do not

yet possess any convenient apparatus by which we can measure correctly the amount of chloroform and ether vapour which we are administering to the patient, and cannot therefore determine the exact quantity employed.

To speak about other mixtures now in use, for instance, Billroth's mixture used in Vienna, and the A.C.E. mixture employed in England, would take too long. Neither can we go into the question of other anaesthetics such as bromethyl and pental, which are rarely used in surgical practice.

Paralysis, which sometimes appears after prolonged anaesthesia, and affects especially the brachial plexus, can probably always be avoided by supporting the upraised arm and by suitable posture.

The subject being so very important, we will briefly recapitulate the preventive measures to be taken in every case of anaesthesia, and we shall follow in the main the rules so excellently set forth by Kümmell.

1. Chloroform is generally to be preferred for the anaesthetic. With patients who are very anaemic or exhausted, who have cardiac disease but are free from any respiratory trouble, ether should be used after the stage of unconsciousness has been induced by chloroform. We may also change to ether when prolonged anaesthesia is required and the heart's action is becoming weak under the influence of the chloroform.

2. The chloroform or ether should be absolutely pure and kept in small dark bottles, 50 grammes of chloroform or 200 grammes of ether in each, protected from light and heat, and should be used out of the bottle itself.

3. Great caution is needed when during the anaesthesia injections of morphia are employed; the combination favours the development of respiratory failure during the later stages of narcosis. On the other hand, it is an advantage, especially in the case of those addicted to alcohol, to administer during chloroform anaesthesia larger or smaller quantities of alcohol.

4. The kidneys, lungs and heart should be examined before giving an anaesthetic.

5. Anaesthesia should be induced in a perfectly quiet room, the patient being in the horizontal posture with the head low. All manipulations before the patient is under the influence of the anaesthetic should be avoided.

6. The anaesthetist should be exclusively occupied with giving the anaesthetic; he should watch the respiration and pulse throughout the whole time, and should be a qualified medical man. The drop method reduces the dangers and should always be used. The shape of the mask should be such as to admit sufficient air. A fresh lining to the mask should be used for each case.

In view of the dangers which are inseparable from anaesthetics as we have seen, a great endeavour is made nowadays to restrict the use of anaesthetics as much as possible and to use *local anaesthesia* instead. Infiltration anaesthesia, introduced by Schleich, has found many adherents during the last few years; this very useful method removes all danger of poisoning by the drug, and is much used for minor surgical operations. The method is applicable only to certain cases and cannot be employed where there is inflammation of the structures, and there would be some danger in making a puncture in the area around infective foci. For major operations and in laparotomies, where we can seldom be quite sure beforehand about the ultimate extent of the operation, and where the result depends largely upon a condition of complete relaxation of the abdominal wall, this method can only exceptionally be used.

For a number of operations on fingers and toes, such as amputation, the avulsion of an ingrowing toenail, whitlows, and so on, Oberst's method of regional anaesthesia is simpler and safer. The finger is raised and emptied of its blood, and then tightly ligatured, a quarter to half a syringeful of a one per cent. cocaine solution is injected in four places below the seat of the ligature. Anaesthesia is complete in three to ten minutes. Here too any possibility of danger of cocaine poisoning is almost entirely excluded, though such danger is always present in the simple subcutaneous use of cocaine, since there is a great difference in the individual susceptibility of patients towards cocaine. In

many cases anaesthesia induced by local cold is sufficient, and for private practice we strongly recommend ethyl-chloride, introduced by Henning of Berlin, and sold in tubes of a convenient size. Its action is very quick, but does not penetrate so deeply as does the ether spray which has been used for years.

Thus time ever brings with it new methods by which we can lessen or entirely remove the pain of operative procedures. We should not narrowly confine ourselves to one method, but for any given case should select that method which brings in its train the least risk of poisoning and of infection. And we are grateful for every new method designed to relieve pain, though we do not always go quite so far as the inventor of the method, who often is blinded by his enthusiasm. For nowhere so much as in the field of medicine do we require a calm unbiassed judgement.

The second great danger in every operation is *infection*. Here also fortunately we are now in safer times than during the stormy period of antiseptics which menaced the patient's already weakened constitution. We have learnt that there are dangers in the immoderate use of antidotes in the form of antiseptics, and have outlived the time of the carbolic spray and strong solutions of corrosive sublimate. We cannot do altogether without antiseptics, especially for wounds which are already infected, but we should endeavour to restrict their use more and more, and most surgeons today are of opinion that we could altogether dispense with the use of antiseptics if we could make sure that there was no infection present before the operation. Under such conditions asepsis would be justified. With our present exact methods of investigation and the advances made in bacteriological research, the requirements for aseptic operations have enormously increased, and we are very apt nowadays to lose ourselves in a minute attention to details to the exclusion of the wider aspects of the subject. Exact inquiry is esential, but if the demands which it makes continue to increase as at present, from gloves to a mask for the face and a bandage for the head, it will be at the cost of the dexterity of the operator, and will tend to

foster a certain over-anxiety and pessimism which in the interests of the patient should be avoided.

The question of wound infection and antiseptics will be detailed later, and we need here mention only those precautionary measures which should be generally followed in every operation. The patient runs some risk both from the operator himself and from his assistants, and it is therefore essential that no one should assist except those whom the operator can thoroughly trust. The main principle should be to have as few hands as possible engaged in the operation and in the handling of the instruments used. We have not yet learned how to make our hands perfectly free from germs, and the surgeon and his assistants, at any rate at major operations, should avoid touching any infectious things or wounds. There are a great number of methods for sterilizing the hands, but for practical purposes Fürbringer's method remains the best: after previous thorough cleansing with soap and brush, alcohol is used to remove any fat, and afterwards a solution of corrosive sublimate (one in a thousand). The hands should be carefully kept, as it has been proved experimentally how much more difficult it is to disinfect rough and cracked hands. It has been shown that it is impossible to keep the hands sterile during a long operation, and gloves were therefore introduced, but have not yet been universally adopted, owing to certain disadvantages. As to instruments, we are now in the happy position to be able to sterilize by steam instruments and ligatures, when made of silk or of metal, and surgeons are therefore gradually giving up the use of catgut ligatures and other materials which cannot be thus sterilized.

A further source of danger in operations arises from the surrounding air, which should be free from dust and so far as is possible free from germs. Good ventilation is therefore essential, and infectious wounds should not be dressed in the operating room when this can be avoided. The room should be so constructed that there are no corners, and that every part of it can be thoroughly washed out, and there should be an adjoining room for sterilizing and

bathing. It is absolutely essential that the patient should have a bath immediately before the operation, and that the part which is to be operated upon and the hands of the operator should be made sterile, so far as it is in our power.

We have considered only those precautions which are most important on the whole; but there are numerous minor details which every operator will observe who claims that he works aseptically, and these can only be learned in course of time by careful study.

Whoever is not in a position to carry out all these rules, as is generally the case in private practice, should follow all the instructions laid down for the antiseptic treatment.

After the operation come the critical days when the pulse, the temperature and the general condition of the patient must be watched, and any deviation from the normal course at once reported, so that suitable treatment may be adopted and so that no symptom be unnoticed and allowed to get worse. One should always bear in mind the rule that it is better to change a dressing too often than to expose the patient to the risk of a spreading suppuration of the wound.

Esmarch's bloodless method, introduced for operations upon the extremities, is an excellent method for preventing the exhaustion which follows severe loss of blood during operations; indeed haemorrhage during such operations may be altogether avoided by this method. In major operations on the abdomen or trunk haemorrhage may be severe, and to prevent serious consequences we make use of the simple method of the subcutaneous injection of saline solution, which answers extremely well in these cases. Many surgeons employ these injections as a prophylactic in all cases where much haemorrhage is likely to occur. A similar result can be obtained by rectal injections of large quantities of fluid.

Often too in surgery we perform operations which may be termed preventive, for instance operations for recurrent attacks of appendicitis and for reducible herniae. The indications for these operations are not easy to determine, and we must carefully weigh both the probability and signifi-

cance of unpleasant and serious symptoms which may arise and also the possible risks of the operation. A thorough knowledge of the latter and the possibility of reducing them to a minimum by preventive measures will enable us to proceed with an operation and carry the case to a successful issue instead of avoiding the operation from a fear of the consequences. In general, for the cases just mentioned, the rule now is to operate for recurrent appendicitis in the interval between the attacks, and not wait till some subsequent attack causes perforation of the appendix and a dangerous peritonitis is set up.

The radical operation for reducible hernia is evidently a preventive operation. The operation should be performed as early as possible. It can be easily done during childhood and the results are more likely to be permanent than when the operation is performed in adult life.

To return to Esmarch's bloodless method, which is of extreme importance so far as the patient is concerned, for the less the haemorrhage the sooner will the patient recover from the results of the operation. This method has advantages too from the surgeon's point of view, the exposed surfaces are free from blood and enable him to see clearly what he is doing and to operate as safely and calmly as on the dead body.

Whenever it is feasible, we recommend that the limb be made bloodless by suspension, and that subsequent digital compression of the large arteries of the limb be employed. The subsequent haemorrhage is then apt to be much less than when compression has been exercised by means of an indiarubber band. The general oozing may at times be very troublesome when the tourniquet is removed. These cases are best treated by general pressure upon the bleeding surfaces for some minutes rather than by the application at once of numerous ligatures. The pressure stops some of the haemorrhage, and any haemorrhage persisting should as far as possible be stopped by torsion of the bleeding vessels, so that very few ligatures need be applied, for the ligature after all must be regarded as a foreign body in the wound.

II. PREVENTIVE MEASURES IN THE TREATMENT OF WOUNDS.

Since the human race has existed man has in his passage from the cradle to the grave always been exposed to the risk of injuries and wounds, and has been obliged to treat them. Even skulls from prehistoric graves have been found which show the marks of trephining. We know that thousands of years ago the Indians and Egyptians practised surgery with great skill, and that today we still carry out their methods for certain plastic operations upon the face. The greatest step forward which surgery has taken during the last twenty years is closely related to the question of the treatment of wounds. After Lister conceived the idea that all inflammations, suppuration and decomposition attendant upon wounds, were traceable to the entrance of micro-organisms into the wound, he introduced his antiseptic method, which in a brief space of time spread over the entire civilized world.

Although favourable results followed this treatment, such as had never before entered our thoughts, and opened up new realms to surgery, yet certain disadvantages appeared too which everywhere surgeons strove to remove. Among German surgeons who worked at introducing improvements in the treatment of wounds, and at perfecting this method, the names Von Bergmann, Bruns, Neuber, Volkmann, Bardeleben and Maass are familiar to us, and the antiseptic period passed into the aseptic period. We have intentionally avoided saying that the one has displaced the other, because we are of opinion that asepsis does not exclude antisepsis, but that each is a complement of the other. In his textbook of Antiseptic Surgery, when treating of the practicability of the aseptic treatment of wounds, Watson Cheyne writes: "The method is theoretically correct, and can be successfully carried out by skilled bacteriologists, but the risks of error are so great that an ordinary surgeon, who has not had a prolonged bacteriological training, meets with so many difficulties

that the results cannot compare with those attained by antisepsis."

When we call to mind the conditions which existed in our surgical wards before Lister's time, we shall realize the immense changes brought about in a short space of time by antisepsis. In those days it was a rare exception to find an amputation stump, or a compound fracture, healing without inflammation and suppuration. Indeed even slight unimportant injuries were frequently attacked by erysipelas, hospital gangrene, tetanus or fatal septicaemia. Volkmann has openly stated that he was on the point of closing his wards because he was powerless to do anything more against these infective diseases of wounds, yet a few years later he was able to report 129 amputations with only one death from wound infection. In Nussbaum's surgical wards at Munich, every case of compound fracture ended fatally, and eighty per cent. of all cases of wounds and ulcers became a prey to hospital gangrene; yet shortly afterwards, without making any other alterations except the introduction of the antiseptic method, Nussbaum's results were as brilliant as those obtained by surgeons at Halle. When a method is known to have brought about such enormous results, the reasons which would induce us to abandon that method must be very cogent, or we must be in a position to substitute for this method a still better one. As to the former it should be remembered that the antiseptic substances we employ are very different one from another, and that a slight increase in the effect produced may suffice seriously to injure the organism. Yet this slight excess can never beforehand be definitely determined, for different people show a marked difference in their susceptibility to these substances, and the amount which will produce symptoms of poisoning varies much with individuals. Nevertheless our experience during the last twenty years has taught us clearly how far we may in general venture in the use of antiseptics, and we are able at the present day to use antiseptics of a strength which only in rarest cases lead to any ill effects. Practical experience in this matter is the best

guide, while theory which aims at removing one danger only brings in its train other dangers. To pursue this course would be to give up the beneficent action of narcotics, to dispense with the good effects of mercury and of potassium iodide, and lastly even to renounce the use of salicylic acid. Today we use antiseptics only when we cannot secure conditions of asepsis, as often occurs in private practice, or when inflammation or suppuration already exists, and we cannot look upon antiseptics as injurious when we see the good results obtained by their use. We can truly affirm today that we possess a method by which, with an ever diminishing number of exceptions, we can prevent these infective diseases from attacking wounds and extensive injuries, and have removed what was a source of terror to surgeons in former years.

The correct use of asepsis and antisepsis is not the only measure we adopt in the preventive treatment of wounds, but a number of other points also require attention. Before we attempt to close a wound by stitches, all haemorrhage must be stopped. Here again the principle should be to employ the simplest method and to stop haemorrhage by compression, except when the vessel is large and would be apt to open again. The ligature in unfavourable conditions is a source of some irritation, and may act as a foreign body and delay the rapid healing of the wound. Sutures should be very carefully placed, especially when we wish to avoid scars, as on the face, and the edges of the wound must be carefully approximated. This, together with a very careful handling of the injured tissues, which must not be mechanically or chemically injured by strong antiseptics, will prevent exudation if the wound is recent. When exudation cannot be prevented, as in the case of wounds impregnated with mud from the street, it is better not to try to obtain primary union by suturing. When the wound is large, and there are recesses and pockets in which blood and exudation products may accumulate, these cavities must be emptied, and the sides kept together by stitches, or they must be plugged. Plugging, especially, may be regarded as a sovereign

remedy against the dangers of infection which always threaten a wound cavity, as after extirpation of the rectum, which cannot be kept perfectly clean, and it should also be used in recent wounds which for other reasons cannot be safely disinfected. Sutures should not be too close together, otherwise the nutrition of the wound edges is interfered with; indeed even gangrene of the part may be caused by sutures which are too tightly drawn. A task which confronts the surgeon as frequently as does the treatment of recent wounds, is the treatment of wounds which are already infected, so that they may heal aseptically. When we remember that in the case of most wounds we cannot know whether the wound became infected at the moment it was inflicted, the question naturally arises, "How long after the infliction of a wound is it still possible to make the wound aseptic, and which methods are of value?"

In the year 1894, Schimmelbusch gave an account of his recent experiments upon the infection of wounds, and the result was to influence us greatly in our treatment of wounds. His inoculations of mice and guineapigs with cultures of anthrax and streptococci yielded astonishing results, and the great differences observed in the reaction to the virus shown by the various animals, made him feel that he was not justified in applying the conclusions to man. He mentions the difficulty of getting a virus whose degree of virulence is constant, quite apart from the consideration of the varying susceptibility of individual animals to the virus, so that we might almost get the impression that each animal had its own special exciting causes of suppuration. Most remarkable of all was the rapid absorption of bacteria, which made it impossible to disinfect the wound and save the animal, though antiseptics were immediately afterwards applied to the wound which had been infected with anthrax or streptococci. Fortunately this rapid absorption and virulence of the bacteria occurs only in recent bleeding wounds, and then only when the poison has been inserted in the recesses of the wound.

Further the risk of infection of recent wounds diminishes from day to day as the wound gets older; and wounds which are from twenty-four to forty-eight hours old are very resistant to bacteria, and can only seldom and with difficulty be infected. These results were later confirmed by a number of investigators, who mostly worked with very virulent cultures, till Henle's researches made with less virulent pus cocci, showed that it was possible to sterilize wounds with a corrosive sublimate solution of a strength of one in a thousand, three hours, and in some cases even eight hours, after they had been infected. Messner's experiments showed that with one single exception, gangrene or fatal sepsis supervened when the infected wounds were treated aseptically, while in all cases which were treated antiseptically the infection remained localized. We see then how widely individual results differ even with the most careful and exact investigators, and must therefore avoid drawing definite conclusions from these results. Nevertheless all authorities agree that the main principles of asepsis as carried out today in the treatment of infected and noninfected wounds in general are correct.

The after treatment and a watchful care of the patient are part of the surgeon's work. Rest is one of the most important conditions for the healing of a wound. For a wound on the lower extremities it is therefore advisable that the patient should be kept lying down; in this way we secure for the injured limb the most favourable conditions for a good circulation, and this plays an important part in the healing of wounds. For wounds of the upper extremities we should prevent obstruction to the circulation and the accumulation of exudations by placing the patient in a suitable posture, keeping the limb raised, and thus aiding the return of the venous blood. According to our present views, the dressing should be kept dry, and it is therefore necessary to change the dressing when it is seen to be soaked through with blood and exudation. The dressing must also be changed if it becomes at all displaced, or if there is pain, because an uncomplicated wound if properly treated ought to give rise to no pain. Obviously

too the dressing must be changed immediately if there is any disturbance in the general condition of the patient or any rise of temperature. If all these precautions have been carefully observed, we can then with a good conscience view any disturbance which may arise in the healing process, though such disturbance is fortunately most rare nowadays, and we shall still be in the position to take adequate measures to prevent greater mischief and those devastating infectious diseases of earlier times.

Buchner has called attention to one matter in which we still fail: we do not avail ourselves sufficiently of nature's means of defence provided against infective processes. The blood is the most important of these, owing to its absorptive and bactericidal properties. To further absorption and the healing process, a large quantity of blood is required by the injured part, and a stronger local circulation, so that the tissues may be bathed with more blood in a given time than is usual. How this may practically be accomplished will be described later.

The rules laid down for the correct treatment of wounds were drawn up in accordance with results obtained in the treatment of compound fractures. In his well known work on the treatment of compound fractures, which prepared the way for the antiseptic treatment of wounds, Volkmann taught that in a compound fracture, with the exception of fractures caused by puncture, the wound should be thoroughly laid open and all recesses be followed up; in brief, he advocated the so-called "incision method" of treating compound fractures. The method was adopted by most surgeons and practised without modifications till the results obtained by Von Bergmann in the Russo-Turkish war were made known. In the severe injuries treated during this war Von Bergmann avoided wherever possible making any examination of the wound: he simply dressed the wound and at once put the limb in a plaster of Paris bandage. The results were brilliant. They tended to introduce a more expectant method of treatment for compound fractures met with in civil life. And then our highly esteemed teacher, Maass, taught as the result

of experience gained from injuries inflicted in various severe railway accidents, that equally good results could be obtained in the treatment of compound fractures when incisions were not used, and the surface around the wound was thoroughly disinfected and the wound was merely dressed antiseptically and only touched so far as was necessary to remove loose pieces of bone and tissue. Maass started with the correct assumption that the exciting causes of these infective diseases of wounds were not present everywhere. There are indeed micro-organisms in the mud which may get into the wound, but these micro-organisms are not pathogenic. And as early as the year 1885 Maass was able to describe forty-five cases of compound fracture with only three deaths, and in these three cases death was not in any way connected with the treatment of the wound. All other cases treated by this conservative method healed without any of them becoming affected by a wound infection. Similar good results were recorded in other hospitals, and thus the conservative method was introduced. Not only compound fractures but all other wounds should so far as is possible be treated conservatively. This is especially true of gunshot injuries, where prophylactic measures in examining the wound are of the utmost importance. Examination with finger or probe should be performed as little as possible, and every operative procedure is wrong, even though the bullet may be felt directly below the skin, and under no circumstances should we disturb this subcutaneous lesion.

When the soft parts are extensively injured and the wound possibly dirty there is still no direct reason for operating in all cases. If the wound is so situated that the exudation can easily flow out, simple irrigation is sufficient, with antiseptic dressing of the wound and fixation of the limb. Operation should only be resorted to when it is feared that the bone or soft parts will cause retention of secretion or the patient becomes feverish.

III. PROPHYLAXIS IN THE TREATMENT OF INFLAMMATORY PROCESSES.

Pain is one of the cardinal symptoms of inflammation, and is the symptom which makes the patient most uneasy and induces him to seek for medical aid. We have already stated elsewhere that the endeavour to relieve pain is one of the noblest aims of the physician, and we state it again here because the cessation of pain in inflammatory processes is in general an indication that the process is at a standstill or is retrogressing. To effect this, the essential requirement at the commencement of every inflammatory process is rest. By the term "rest" we mean medically much more than is denoted by it in ordinary life, and it includes a number of means all designed to procure those conditions which are required for the cure of the diseased part. First among these is a suitable posture. The greatest pleasure for the physician when called for the first time to a patient who is suffering much, is to be able at once and possibly by some simple device to rid him of his pain or at least to alleviate it. In this respect doctors often err greatly, especially in treating surgical cases. Students hear mostly very little about this matter, and yet it is important they should know that the affected knee can be most efficiently put at rest by placing it so that it is slightly flexed, with a support behind the knee which does not press upon the vessels of the popliteal space; and that the most comfortable position for the hip joint is, according to the degree of the local disease, either slight flexion or abduction or a combination of these two. If the limb itself is affected it should be so placed that the circulation is unimpeded; to prevent venous obstruction the distal end should be at a higher level than the proximal, and it may be necessary to assist the venous circulation still further by bandaging the whole limb. These mechanical aids are far more efficacious than the icebag and compress, whose chief value consists in their subjective influence upon the patient. It is necessary to individualize for special cases. Thus, for the head, when there is anaemia,

of the brain, generally indicated by great pallor of the face, we should select the horizontal position for the body and head, or even let the head be slightly lower than the body; while if the vessels of the brain and membranes are congested and the colour of the face is bluish, we should see that the head and upper part of the body are maintained upright. Unless these points are observed icebags and other medical applications will be of no avail. These are the main principles upon which all further measures to remove inflammation and prevent its spread must be based. In general we may say that it is possible to remove inflammation in the majority of cases when it has not passed beyond the first stage, but often unfortunately we do not see these inflammatory processes till there is some amount of infiltration or deep suppuration.

Before all else it is then essential to prevent a spread of the inflammation and to utilize all the resources available in the organism. The diseased area is, as we know, to a certain extent cut off from the general circulation of the body by a bulwark in the form of thrombi and by the reaction of the surrounding healthy structures. This protecting wall gives way the moment the pressure within the affected area becomes too great, the boundary line is passed and the body must again work at forming a fresh protective bulwark. But with the giving way of the boundary wall there is the possibility of a general infection with its often fatal consequences, and this we must endeavour to prevent in every possible way. This is best done by incisions, which relieve the tension and at the same time provide a way of escape for the accumulating pathological secretions. It is evident, as previously stated, that our methods of treatment must be based upon physical laws and be aided by the powers given by nature if we are to combat successfully the many injurious influences brought to bear upon the body.

Free incisions are needed for well marked suppurative inflammation, but in making them it must be remembered that we wish also ultimately to restore the functions of the diseased part. The incisions should therefore always

be made in the longitudinal axis of the trunk or limb; they should be parallel to one another and placed so as to avoid vessels and nerves. In this way we obtain smooth and non-adherent scars and we shall not interfere with the functions of the limb. When, as often happens in the country, cases are brought for treatment only after the process has advanced far, with extensive loss of skin, we should as soon as the wound is clean cover the exposed surface by Thiersch grafts or by grafting with pieces of skin, either stalked or unstalked, and thus prevent contractions which would interfere with the free use of the limb.

Incisions alone are not enough; a free outlet for the pus must also be provided, and the means to be adopted have already been mentioned, namely, plugging, drainage, and irrigation with weak antiseptic solutions.

One other point requires mention. When the products of inflammation are within a rigid walled cavity, an operation should be undertaken. For empyema of the frontal sinus we trephine the frontal bone; for empyema of the pleura we resect one or more ribs; for acute infective osteo-myelitis we chisel open the long bone in its entire length in order that the diseased marrow may escape. All this is prophylactic treatment, and by these timely operations we save the patient from chronic disease or even from death.

By carrying out this treatment from the commencement we are nowadays in the happy position of being able in a very large majority of cases to prevent a process which is still local from spreading and setting up a general infection. The case is otherwise with specific inflammations, but these cannot here be described as our object is to give a sketch of preventive treatment from the general standpoint, for every method of treatment is in a sense prophylactic. For instance, in commencing tuberculosis of a joint, we endeavour to put the joint at rest, to remove all strain upon it, and by extension to keep the two articular surfaces from touching one another; our object is to prevent destruction of the joint, to cure it quickly, and to restore its function.

Thanks to this conservative tendency in surgery, excisions in early childhood, which so much crippled the joint, have almost ceased to be performed. This conservative method should always be kept in mind and all operations avoided which would impair the function of the part. Therefore we welcome Bier's "stasis method" for tuberculous joints as a great step forward, and we make use of nature by venous hyperæmia to carry on the struggle against the invaders with success. And the results of the hot air treatment of chronic inflammations of joints seem to be brought about by arterial hyperaemia, which enables absorption and regeneration by the blood to go on more vigorously and for a longer time. This is in close accord with the views of Buchner, who considers that practical methods in the future will rely more and more upon effects produced through the circulation.

B. Special Prophylaxis

I. PROPHYLAXIS IN THE TREATMENT OF FRACTURES

Prophylactic treatment in the strict sense of the word is not applicable to fractures and dislocations, but in speaking about the general etiology of fractures we shall find that the mode of life and occupation exercise an important influence upon individual predisposition to fractures and expose certain individuals more or less to the danger of sustaining fractures. Moreover we consider that the principles and rules which should be our guide in the treatment of fractures and dislocations, especially when dressing them for the first time, belong to prophylaxis.

Above all we should aim from the very first at restoring the part to its normal function, and this will only be possible if we have a due appreciation of the errors which may be made in treating fractures. It matters very much whether the treatment of a simple fracture of the malleolus leaves the patient after a short time with a movable ankle and able to walk as well as he could before the fracture, or whether it leaves him a cripple for life with a foot fixed in the valgus position. We need scarcely point

out that this is not a rare occurrence after a simple fracture. Every experienced surgeon has had many such cases brought to his notice where the bad result could only be ascribed to bad treatment. In no other cases is it so all-important that the first splints or bandages should in every way be very exactly applied if we are not afterwards to see patients walking about crippled who might with better treatment have been completely restored. When a fracture near a joint has united in bad position, it is generally impossible to put things right even by a further operation. Nowadays too, thanks to laws about accidents, no workman would care to undergo an operation which promised to improve his condition and would at the same time reduce his allowance. It would seem too that the laws against doctors for *mal praxis* are to be more stringent, and for this reason greater caution should be exercised. In the following paragraphs we shall consider more in detail the etiology of fractures and dislocations and of predisposing causes, some of which depend upon external conditions, others upon the condition and nature of the bone, and thus we shall learn what are the mistakes which may lead to bad results.

Among the various kinds of injury caused by accidents and requiring surgical treatment, fractures are the most common. Statistics from the Reports of the London Hospital, extending over a period of a few years, showed that among 307,352 injuries reported, 45,781 were fractures, that is a percentage of 14·9, so that fractures constituted a seventh part of all accidents treated there.

Age has an important influence upon fractures. In childhood fractures of the bones of the forearm are the most common; next come fractures of the humerus, especially of its lower articular end, and fractures of the clavicle. In adult life fractures of the upper limb are less common than fractures of the lower limb; fractures of the ribs, almost unknown in childhood, are comparatively common in adult life; and fractures of the patella and olecranon are most common during adult life, though very rare in childhood. Finally, in old age, fractures of the

lower limb are the most common, especially fracture of the neck of the femur. Fractures of the radius, ribs and upper extremity of the humerus are also common in old age. For diagnostic purposes, the differences in the various periods of life are important, especially when the signs of the fracture are not very evident. As an example, consider the case of a person advanced in years, who falls and complains of severe pain in the region of the hip joint. The signs of fracture may not be evident, yet we may with tolerable certainty assume that it is a case of fracture of the neck of the femur, and it will always be best to act upon this assumption rather than have this fact forced upon us later to our surprise. Nevertheless, fractures of the neck of the femur in youth are not quite so rare as is generally thought to be the case. It would seem that often they have not been diagnosed, and the result is most serious for the patient.

There are great differences in the degree of brittleness of the various bones of the skeleton, and the bones of some individuals are much more apt to fracture than the bones of others. The firmness of the osseous structure varies extraordinarily in different individuals as well as in the various bones of the same individual, and even at different parts of one and the same bone. In general we can distinguish between predisposing causes and accidental causes of fractures, and the former are especially interesting to us in so far as we are able to take precautionary measures against them. Apart from the physiological condition of the bone itself, evidenced by its degree of firmness and elasticity or dependent upon the position and function of that particular bone, a great factor in the causation of fractures is to be found in the individual's mode of life and occupation ; and certain fractures have therefore been termed " workmen's fractures." The season of the year also has some influence, especially in large towns, where workpeople have to go long distances to their work; and there is a marked increase in the number of fractures when the roads are bad and covered with snow and ice. Certain pathological conditions of the bone itself will also predispose to fracture.

The statistics mentioned above have shown us that the

greatest number of fractures, about 43·8 per cent. of all fractures, occur during the middle period of adult life—between the ages of 30 and 60. This is explained by the fact that people at this age are most exposed to those accidental causes of fractures met with in workshops, factories, in building, and in agriculture. This will be more fully dealt with in the chapter on prophylaxis against accidents, and we now pass on to consider pathological predisposition to fractures. To this group belong all those diseases of bone which produce an abnormal brittleness of the osseous substance, so that a very slight force, indeed the mere contraction of a muscle, suffices to fracture the bone. The practical importance of knowing this etiological factor is evident, because often attention is first drawn to the existence of disease of the bone by the occurrence of a fracture without adequate external cause.

Great interest is attached to the brittleness of bones produced by osseous atrophy, and mostly seen in old people, and we cannot explain the frequent occurrence of fractures in very old people otherwise than through the excessive brittleness of their bones. It is therefore our duty to draw the attention of the relatives of aged people to this danger. It once happened to us when performing artificial respiration on an old man of seventy to hear a rib snap with a loud crack, though no great force was being used. When a bone has not been used for a long time, in consequence of some chronic inflammation of a bone or joint, or from paralysis, by which the limb has been rendered more or less completely useless for years, great caution must be exercised when the patient gets about again, since the slightest external cause, even a clumsy movement, may suffice to fracture the bone. Such patients must very slowly and gradually accustom their bones again to bear the weight of the body. Atrophy of bone with excessive brittleness after long disuse is not at all uncommon in youth. Bruns relates that in a case of hip disease, which was cured after several years, the femur broke in the lower third when a careful attempt was made at passive movement of the hip joint.

There are, too, several diseases of the central nervous system, chronic diseases of the spinal cord and of the brain, in which the bones become very brittle. This condition of the bones should be constantly borne in mind, that the patients may be guarded or at least warned against these possible dangers which threaten them. In tabes dorsalis Charcot found the primary cause of fracture to be a nutritional disturbance of the osseous tissue; but spontaneous fractures occur even more frequently in general paralysis. It is well known that spontaneous fractures are not at all uncommon in lunatic asylums, and when shortly after death an autopsy is made on the body of such patients, we find an abnormal degree of softness of the bones, and they have a thin layer of compact osseous tissue and dark coloured marrow, while the cancellous tissue consists of a few wide meshes filled with thick fluid blood. In most of the cases, unfortunately the external exciting cause of the fracture is so slight that it is scarcely possible to guard patients against it. The case is very different when the brittleness of the bone is a consequence of osteomyelitis with necrosis of bone. Here it is always possible to determine what cavities exist by careful examination and by a probe, or even by the Röntgen rays, and we can thus determine how much bone remains, and provide the patient with an apparatus for supporting the bone if there is any danger of possible fracture.

In childhood the commonest predisposing cause of greenstick and complete fractures is rickets, and this explains the great frequency of fracture at this age. Greenstick fractures are particularly common, more common than is generally believed, and many such fractures are overlooked. This fact is not surprising when we remember the nature of the rickety process, the abnormal growth of intermediary cartilage and of periosteum, and the formation of imperfectly calcified soft osseous tissue instead of the normal bony structure. All of these conditions are particularly favourable to the occurrence of greenstick fracture, in which only one side of the bone is fractured, while the other side of the bone is bent. The slightest external violence is often enough

to cause a greenstick fracture, and a careless dragging by the arm or a fall on level ground may fracture the bone. Therefore this angular bending occurs generally at typical places and in typical directions for the different bones. In the leg it is generally in the lower third, and the curve of the angle is directed outwards, or more rarely forwards or inwards; in the thigh it is outwards; in the forearm, outwards; in the upper arm, inwards. From the nature of the case it follows that these fractures are long in uniting in consequence of the defective formation of callus, and we should remember that the union of the fractured ends may be hastened by treating the rickets. When speaking later about deformities we shall have an opportunity of mentioning the prophylactic measures needed for the treatment of rickets, and will merely state here that the early treatment and prevention of rickets is the best prophylaxis against these fractures. It is of importance to diagnose these greenstick fractures correctly, that we may correct the displacement at once. Indeed it is often possible at the same time to remove the rachitic curvature if the fracture is situated near the curve or even at the curve itself.

Among constitutional diseases syphilis was formerly thought to be a frequent cause of spontaneous fracture, but nowadays it is thought that spontaneous fracture as the result of syphilis is very rare, when the extraordinary frequency of syphilis is borne in mind. The many cases of fracture occurring with syphilis in remoter times are probably referable to local gummatous affections of bones, which led to spontaneous fracture when the bony structure was extensively involved. On the other hand, there is more reason for regarding congenital syphilis as the primary cause of fractures which occur before birth, during birth, or soon after birth. In addition to the local treatment of the fracture itself, anti-syphilitic remedies are here of great importance.

To complete this subject it is necessary to mention that a certain brittleness of the bones is a consequence of scurvy, and that a number of cases have been published of spontaneous fracture occurring in carcinoma and in sarcoma of

bone. Here, as well as in cases of cysts and enchondromata of bones, it is essential to make an early diagnosis, that the operative procedures, which are required in some cases, may be crowned with success. The Röntgen ray illumination is a valuable aid in the diagnosis of affections of bones, and it would seem that early diagnosis and operation enable our treatment to be more conservative than formerly it was, and cases of sarcoma of bone for which resection has been performed instead of an amputation and without recurrence have been much more numerous of late years. Especially is this so when compared with former years, when in every case of sarcoma of bone the affected limb was simply amputated.

There is still another form of brittleness of bone, the anatomical cause of which is still obscure, and which is therefore termed idiopathic. Here there exists a strong predisposition to fracture without any apparent cause, and in some cases the only aetiological factor is heredity, which may be traced through several generations. When this hereditary predisposition is known to exist, the attention of the members of that family should be drawn to the danger. No other prophylactic measure is practicable, as the nature of the nutritional disturbance in the osseous structures, which is probably the cause of the fracture, is wholly unknown.

We have separated the predisposing causes from the accidental cause, and now will briefly consider the latter.

All possible kinds of force may produce a fracture whenever the force applied is sufficient to overcome the elasticity and firmness of the osseous structure. One of the most frequent causes is a fall on the level ground or from a height, or it may be a push, a blow, or being run over by a vehicle, so that in the daily events of life there are always risks of meeting with an accident which will cause a fracture. There are a number of occupations, such as slating roofs, which are specially dangerous, and these will be spoken of later. We cannot guard men against the accidental causes which are incident to daily life.

A few important points will next be considered in con-

nexion with the making of the diagnosis and the first application of the splints, for upon these the successful union of the fracture and restoration of the function of the limb will depend.

The examination of the injured person who is suspected of having sustained a fracture must first be most thorough, for such an examination only will enable us to judge of the prognosis and to decide upon the treatment which is required. And here the old rule cannot be too strongly emphasized—first the history of the case should be obtained, then an inspection be made, and lastly we proceed to manual examination. The importance of the exact history of the case is self evident after what has been said above about predisposing causes of fractures, and it will often give us valuable information. It will tell us how the fracture was caused, whether by mere muscular action or by direct or indirect external violence ; and we can find out exactly the kind and degree of the external violence and the direction in which this force acted. In inspection the chief rule is to compare the two sides of the body that we may obtain a correct estimate of the deformity present. Before inspecting the legs we must see that so far as possible the two are in exactly similar positions, and must note the position of the pelvis; and in the case of the upper limbs the two shoulders should be at the same level. We cannot go into every detail, there are so many deviations from the normal; for instance, increased or decreased length of limb, abnormal curvature, rotation, or widening, which can only be accurately and correctly seen by one who has had much practice in observing the normal form. Correct observation is the first essential in making an examination to determine the diagnosis; the indications for subsequent therapeutic measures and a successful result depend largely upon it.

By inspection we determine one of the three cardinal signs, namely, the abnormal curvature or angular deformity present; manual examination gives us information about the other two cardinal signs, crepitus and abnormal mobility. The difficulty in diagnosis arises when these three signs are absent, as is often the case, and we can then

merely assume the probability of the existence of a fracture by the presence of the characteristic pain of a fracture and extravasation of blood, along with the history of the kind of violence sustained. In doubtful cases it is safest to act as previously recommended, and in the interests of the patient to assume that a fracture exists, rather than to exclude that possibility because the signs are obscure. A fracture which has not been diagnosed and treated as such may cause most serious and permanent loss of function; while a contusion or distortion which has been treated as a fracture will be none the worse for the treatment.

In the Röntgen rays we possess nowadays a valuable aid to diagnosis, but many doctors, especially those in the country, are unable to avail themselves of this aid, and moreover it would be a pity to apply this method at the expense of our old methods of examination. When the latter fail us we can call the radiograph to our aid, and we may use the radiograph to see whether our therapeutic measures are correct; for the rest it is wisest to continue to employ our classical methods of examination, and in the interests of the future medical practitioner to retain the valuable faculty for keen observation and judgment.

In speaking about the treatment of compound fractures Volkmann said, "the first application of the bandage decides the fate of the patient and determines the course which the wound will run": the first half of this sentence is applicable also to simple fractures. Even when the treatment has been correct, there are nevertheless a number of cases in which some deformity remains after the fracture has united, or in which union fails, yet it must be acknowledged that this is sometimes the result of improper treatment. We are here concerned with finding out what are the sources of error which prevent a perfect union of the fracture, and will therefore consider in detail the most common mistakes in treatment, especially in the application of the first bandages. This is the more necessary because patients with badly united fractures are very apt to hold the surgeon responsible for the deformity.

The first condition in the treatment of a fracture is to

remove the deformity before applying the splint; in other words, to fit the broken ends of the bone accurately together. Take as an example the commonest fracture, at the lower end of the radius. If before applying the splint we do not correct both the faulty "bayonet" position and the radial abduction, we shall be sure to obtain an oblique union of the fracture and consequent great limitation of movement. The kind of splint used is of no great importance, but it must be exactly applied so as to correct, and in some cases even to over-correct, the deformity. The old rule should be acted upon, and an immovable splint be in general applied only after the swelling of the limb has subsided; and when for other reasons this course is not possible, the splint should be changed after five to eight days, and any remaining deformity be removed. The application of a plaster of Paris splint immediately after the occurrence of the fracture, especially in fracture of the forearm, brings with it the danger of pressure or of constriction of the limb, because in all cases of fracture some swelling is certain to supervene. When the plaster of Paris splint is applied one or two days after the occurrence of the fracture, when the swelling is at its height, the bandage becomes loose as the swelling subsides, and the ends readily become displaced. It is therefore advisable to apply the plaster of Paris bandage either not till two or three days after the occurrence of the fracture when the swelling has subsided, or if it must be applied earlier, to change it after eight or ten days.

These are indeed fundamental rules with which we may assume every surgeon is acquainted, but they are not always carried out, otherwise there would not be so many badly united fractures which, providing there was no complication present, might have united so as to leave no impairment of function. The hospital surgeon who can examine his patients daily, and who daily applies plaster of Paris splints, and has a great deal of practice in making plaster splints fit accurately and well—by no means an easy matter—may under exceptional circumstances depart from the rules given above, but a surgeon in private

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practice will always do well to keep strictly to the rules laid down if he would be spared unpleasant surprises in this direction.

In this connexion we may say a few words about the so-called "ambulatory" treatment, which has in its time been regarded as a valuable method in the treatment of fractures, but which is not free from certain dangers for the patient. There are many doctors who used this method which was so much praised, and who only afterwards, by experience of such cases, learned the disadvantages inherent in the method.

We cannot here thoroughly go into the technique of the ambulatory treatment, and must refer the reader to Hoffa's textbook on Fractures and Dislocations, in which the method is minutely described. In many cases the ordinary plaster of Paris splint suffices. It should not be too thickly padded, and it is merely necessary that the splint be to some extent shaped to the natural supporting points of the extremity to avoid pressure on the projecting parts of the bone and all deformity. Special care should be taken to avoid any pressure upon the peroneal nerve behind the head of the fibula, otherwise paralysis of the nerve is apt to set in, and it is very difficult to cure. If the technique of this ambulatory treatment is completely understood, it may be recommended for fractures with little displacement in the middle or upper third of the leg. On the other hand, we strongly caution the surgeon against its use for fractures of the malleoli, for our experience has shown that the dreaded valgus position often follows its use. And we do not recommend this treatment for fractures of the femur; even Krause has given up using it.

We consider a good splint for walking is most useful in the treatment of intra-capsular fractures of the neck of the femur in very old people. In such patients, as we know from experience, bony union does not generally occur. On the other hand, when these old people are confined to bed for a long time, there is the danger that they may get hypostatic pneumonia and pressure sores which may prove fatal. Our

rule is therefore to get these patients up as soon as possible. It is best to have a well fitting splint made for them, with a pelvic band, although the same result may be obtained by a bandage which is properly applied. These patients should be early treated with massage and passive movements.

This brings us to the modern method so much employed in the treatment of fractures at a joint, the so-called physical method, first introduced by Lucas Championière and made known in Germany by the work of Landerer. Some fractures, for instance fractures of the patella or olecranon, may at once be treated by massage after a proper splint has been applied. By this method the cure is hastened and the troublesome after effects, especially the muscular atrophy, are avoided, and the function of the limb is restored much earlier. As a rule, in fractures at a joint, movement of the joint may be commenced towards the end of the second week.

These three main points must be observed if we are to prevent the joint becoming stiff: the splint must not be kept on the limb longer than is absolutely necessary, the position in which the joint is placed must be changed, and early massage and passive movements must be used. When the nature of the fracture makes it probable that a stiff joint or even anchylosis will be the consequence, we should in applying the first splint place the joint in a position which will least impair the function of the limb. For the hand the best position is slight dorsal flexion, with the forearm midway between pronation and supination; for the fingers, with the exception of the thumb and little finger, a slight degree of flexion; for the elbow the forearm should be placed at an acute angle with the upper arm; for the shoulder, a slight degree of abduction of the arm. For a stiff ankle joint the best position is dorsal flexion at right angles to the leg and a slight degree of varus; a stiff knee can act best when slightly flexed; and the best position for a stiff hip joint is slight flexion, to make sitting down easier, and slight abduction of the thigh. These rules should be strictly followed not only for fractures but for all other joint affections; if they are not followed,

then when the original trouble has been cured the patient has for the rest of his life to suffer the most serious disadvantages from the false position of the joint.

It is not our intention to go into all the details of the treatment of fractures, but as an example we will select two, namely, fracture of the radius and fracture of the malleoli (Pott's fracture), which together make up nearly one half of all fractures, and will point out how restoration of function may be obtained in the shortest time and malunion prevented.

The first and most important point in the treatment of fracture of the radius is, as with all other fractures, to reduce the fracture properly: this can best be done by strong ulnar flexion combined with palmar flexion, while pressure is made against the projecting piece by the two index fingers so as to bring it in the plane of the rest of the radius. Unfortunately, the great number of fractures which have united with the deformity still present shows that many surgeons do not attempt to correct the deformity or correct it very imperfectly.

To make sure of the correct position it is sufficient to use the so-called "pistol splint," which should be so padded as to exercise very little pressure upon the site of the fracture itself. By this splint the hand is maintained in strong palmar and ulnar flexion. The fingers should be free; this is most important for elderly people, in whom stiffness is otherwise apt to remain for weeks and may be very troublesome to remove. For this reason the splint should reach only as far as the metacarpo-phalangeal joints, in order that the patient may be able to move freely all the finger joints from the very beginning. It is advisable to change the bandage after about six days, to make sure that the fractured bone is in good position, and to correct it if not. About a fortnight after the occurrence of the fracture, if the patient is sensible, massage may be commenced and a spica only applied to the hand; and every day the muscles of the forearm should be kneaded and tapped, and the area over the wrist joint and the callus should be stroked. In this way

it is possible to restore the complete use of the hand in the shortest time.

In a fracture through the malleoli, the external malleolus or fibula is pressed towards the tibia, so that the angle opens outwards while the internal malleolus is displaced slightly downwards below the tibia. This fracture can be reduced by first extending the foot in the longitudinal axis and then bringing it into the position of talipes varus. A plaster of Paris splint should be applied while the foot is in this position, and care should be taken to maintain a slight degree of varus while the bandage is being applied. After five or six days, the bandage should be changed for the same reason as for fracture of the radius, and two weeks after the commencement of the treatment massage and passive movements should be begun and the old splint, which has previously been slit up along both sides, should be reapplied. After about three weeks the patients can go about without difficulty, wearing a laced-up boot. Formerly we dared not even take off the bandage so early, and later on we had to devote our energy to removing the stiffness and the muscular atrophy.

All that has been said about simple fractures applies also to compound fractures in general, though in the latter the treatment of the wound is of the first importance. We saw in the earlier paragraphs that the kind of treatment adopted for such a wound will decide the entire course of the case, and that a mistake in the antiseptic method may render the result doubtful. The treatment of wounds has already been discussed. The same general principles must be followed in the treatment of the wound in a compound fracture, and infection of the wound must be prevented, as it would lead to the most serious consequences in connexion with the fracture. Here too very much will depend upon the way in which the limb is first dressed; this must be adapted to suit any operation, large or small, which is necessary, and the physician will be guided by his previous experience in deciding which is the best method. As a rule the conservative method may be followed in the so-called punctured fracture, provided that antiseptic treat-

ment is possible; in other cases the wound has to be enlarged to secure a free outlet for secretions; or the fractured ends of the bone have to be resected in order that good union may be obtained. Certainly our successful results with these fractures today are numerous when compared with those of pre-antiseptic days, and we have made considerable progress since Volkmann first laid down the principles for the treatment of compound fractures.

These are the most important points, upon the whole, which must be observed if we would prevent faulty union. Very many other points need attention and these are learned only by the experience of many years. We have here merely sketched the fundamental principles upon which every surgeon must act if success is to follow. The more severe the fracture which has to be treated, the more will the surgeon see that the best guarantee for good union and also for true prophylaxis is found in extensive knowledge and ability.

PROPHYLAXIS IN THE TREATMENT OF DISLOCATIONS

Dislocations may be grouped according to their etiology into (1) traumatic, caused by external violence or by muscular action upon a joint which was sound; (2) congenital; (3) spontaneous or inflammatory, which have arisen in the course of certain affections of joints. Traumatic dislocations interest us most, because they require immediate operative treatment. In this respect they may be compared to strangulated hernia, where every hour of delay in reducing the hernia or in operating has most serious consequences. As a rule, when a simple dislocation is at once reduced, perfect restoration of the normal function of the joint may be expected, and this is therefore one of the most satisfactory operations for the surgeon. But if days or weeks have elapsed since the occurrence of the dislocation, great difficulties stand in the way of its reduction and an operation may even be necessary, and there is less hope of a complete restoration of function. We have but little to say about dislocations. It was recognized much earlier than was the case with

fractures, that not much good can be done by fixing the joint for a long time, and gradually the method which combined the simplest possible bandage and early massage and passive movements was introduced, with the object of early restoration of the function of the joint and the prevention of stiffness.

Just as abnormal brittleness of bones predisposes to fractures, so too will abnormal weakness and relaxation of the ligaments predispose to dislocations. Many people who have once had a dislocation of a joint tend to get a recurrence of the dislocation; these cases might be termed habitual dislocations, as the slightest external cause brings them about. This is especially the case with the shoulder joint and the temporo-maxillary joint. Such patients must wear a suitable bandage for years to prevent a greater range of movement than that of which the joint is capable without becoming dislocated. By this means it is possible to prevent dislocation, and according to our experience to effect a cure ultimately.

The diagnosis between dislocation and fracture at the articular end of the bone is generally easy, but in some cases may be very difficult, especially when there is both a fracture and a dislocation. Fracture of the radius affords us a classical example of the difficulty of diagnosis. In the majority of cases before the time of Dupuytren, a fractured radius was taken to be a dislocation of the wrist. Similar mistakes may be made between dislocation of the shoulder joint and fracture of the surgical neck of the humerus, or between a backward dislocation of the elbow and a supracondylar fracture of the humerus. There is also a difficulty in exact diagnosis when small pieces of bone have been broken off. In complicated cases an exact examination is indispensable, and one should not hesitate to use an anaesthetic if the examination is not possible otherwise; the consequences of omitting to make such examination cannot be repaired later. If the surgeon is in doubt about the diagnosis, he should have a skiagram taken with the Röntgen rays in order that the relation between the parts may be made evident.

In the treatment of dislocations the same principles apply as in the treatment of fractures. Here too we aim at early restoration of the functions of the limb, and therefore do not keep the part bandaged up for a long time, but prevent atrophy of the muscles by early massage and the application of electricity, and stiffness of the joint by early passive and active movements. The first thing to be done in a fracture is to correct the deformity; in dislocations too the first step is to reduce the dislocation. The bandage afterwards applied should be as simple as possible and should merely restrain the movements of the affected joint.

To take as an example the most common dislocation, namely, dislocation of the humerus, which forms about fifty per cent. of all dislocations. It suffices, when the dislocation has been reduced, to apply a triangular bandage as an arm sling and a few turns of bandage round the chest. It is best to leave the shoulder quite free so that massage may be carefully employed during the first few days for the extravasation of blood, and electricity may be applied to the brachial plexus. If this is not done, the bruising and tearing of these nerves may lead to serious nutritional changes in the deltoid muscle. After a week, when the rent in the capsule has become closed, a triangular bandage alone as a sling suffices, and light passive movements may be begun; in the third week, stronger passive movements may be used, one hand being placed upon the shoulder to make sure that the movements are at the joint itself. When the dislocation is complicated by a fracture, the bandage must be more firmly applied and must be worn longer, but it is seldom advisable to wear it longer than a fortnight, for otherwise stiffness of the joint is apt to set in, especially in old people, and it is very difficult to remove.

If these principles are followed it will be possible in most cases when the dislocation is a simple one to restore perfectly the functions of the limb.

II. PROPHYLAXIS IN INJURIES THROUGH ACCIDENTS

The Employers' Liability Act in the German empire opened up a new realm in surgery, and was a strong incentive to etiological and therapeutical study, especially in relation to the inquiry into the after effects of such injuries and the connexion existing between these after effects and the original injury. Any surgeon today may be called upon to give an expert opinion about a patient who has met with an accident, and this compels him to familiarize himself with this new branch of surgical science. This new branch has already produced many offshoots, and there are treatises and textbooks which deal minutely with the diseases and injuries which may follow an accident, and the danger of over specialization cannot be excluded. But this must not deter us from recognizing the great advantages which have been the outcome of surgical efforts in this direction. The desire not only that the part should be healed, but also that it might be perfectly restored to its former usefulness, which was first felt by the employers, was afterwards shared by the medical men much more than had been the case formerly. And thus during the last few years we have seen arrangements made in the large cities for first aid in accidents, which are of great value to suffering humanity. Further, we see what a great impulse has been given to the use of mechanical methods of treatment combined with massage. In connexion with this, ambulatory methods were introduced for treating fractures of the lower extremity, and by means of other surgical apparatus we are able to protect the injured part while the patient gets the beneficial effects of the movements of the rest of the body at a much earlier period than formerly was the case. The chief good however of this Employers' Liability Act is that the injured workman is compelled at once to seek medical advice and to allow himself to be treated. If he has not complied with these conditions, compensation may later be refused him. The request made by the employers that the injured workman should be under their care from the very beginning is only

just. The suggestion that it is not good to put these accident cases in a special hospital because it tends to malingering is not to the point, because this tendency among injured persons in general surgical hospitals can by no means be excluded. On the other hand we must not overlook the advantages we possess in the better equipment of these special hospitals with apparatus, and in the better general sanitary arrangements. Our experience too is that the number of cases of malingering in which symptoms are invented which do not exist has not increased in the last few years. Possibly this can in part be explained by the fact that the methods used today for the detection of such malingering make the practice more difficult. Besides we must not undervalue the arrangement which enables the injured person to be watched from the very beginning by the same doctor who treated him immediately after the accident. Indeed it is an excellent precaution against future exaggerations of his complaint, that the patient knows he was carefully examined and his case watched from the very beginning by the doctor who is afterwards called upon to give an opinion as to compensation. It often happens that the surgeon gives an opinion which is asked for when the injured person leaves the hospital, and that the employers' doctor gives a second opinion based upon the condition of the patient at the time when he sees him and without having had personal knowledge of the history of the case. To decide between two opposing opinions, another authority is called in and a final opinion arrived at according to the law, though the patient was not seen or was only once examined. It seems unnecessary to point out who should be the authority recognized. When a skilled surgeon is put at the head of a hospital for these accident cases, there can surely be no serious suspicion against him from the medical point of view. We rejoice in the fact that the law has provided means by which adequate medical aid is forthcoming from the very beginning, and that so far as is possible the bad consequences of the accident are prevented, and that the former indifference in the matter has been replaced by excellent arrangements.

The prophylaxis for injuries caused by the occupation does not differ essentially from that already mentioned for other injuries, and we should only have to repeat most of what has been already said if we were to go into details. It only remains for us therefore to refer to certain special arrangements which are directly or indirectly due to this law about accidents, and to apply them for the purposes of prophylaxis.

First, we must consider the causes of such accidents, because only an exact knowledge of these will enable us to prevent them. They are best divided into internal and external causes, of which the former are partly personal but rest also partly upon an unfit condition of health. Among the former are included accidents which are the result of inattention, of carelessness in the working of machines, disregard of well known precautions and so on. To prevent or at any rate to reduce the number of these, it is necessary again and again to draw attention to the dangers, not only by printed rules, but also from time to time verbally; by fines for infringement of the rules, and by strict supervision to see that the rules are kept by the workmen. They need some training and education to observe these precautions at all times. We are convinced that when this course is adopted the number of accidents will be diminished; and that this is possible is shown by the great differences in the frequency of such accidents in the same occupation.

As to the physical fitness of the workman, it might easily be determined by medical examination whether the workman's general constitution fits him for the particular work and should enable him to do it without injury to himself. Many a workman is fit to undertake the heaviest work out of doors who could not work in a confined space without injury to his health. It is perhaps only a pious wish to desire the appointment of doctors, especially in large manufactories, whose aid should not merely be sought when the health has already been endangered, but who would regularly from time to time examine the workmen as to their bodily fitness for the work. There is today an humani-

tarian tendency which might easily be diverted into this channel, just as the appointment of doctors to schools will be generally adopted when the government is convinced of the utility. There are plenty of young doctors, especially in large towns, who would gladly devote their leisure time to this useful work without requiring much remuneration.

Among external causes of accidents, those which are general come first, such as unfavourable conditions of the weather; the influence too of holidays and Sundays must not be underestimated, and is most marked in the building trade where a large number of accidents occur on Mondays, and the chief factor at work in this is alcohol. It is superfluous here to go into details about the injurious effects of the excessive use of alcohol, and we must also, on account of the small space at our disposal in this work, refrain from mentioning the measures which should be taken against this abuse of alcohol. The question has been thoroughly discussed in all its relations by doctors and by the public, and the old opposition still exists from time to time between the advocates of total abstinence and those who preach a moderate use of alcoholic liquors. But these theoretical considerations are beside the point when we want to help the workman, and it becomes then necessary to supply him with substitutes for the alcohol, by improving his position, by ameliorating the domestic arrangements made for him, by providing public amusements, free baths, libraries and coffee houses. The workman who during the week has to work hard should have opportunities afforded him of getting recreation at no great cost and with ease, so that he may not seek relief in the sorrow-killing but dangerous alcohol.

Among the special causes of accidents are those which are peculiar to certain trades. The accidents in engineering are different from those in textile manufactures, and these are both different from those in the building trade, and general statistical tables have been drawn up by the various societies. Very large numbers are dealt with in these tables, and as they contain interesting data about the chief causes of accidents, a few of the numbers will now be given.

In the year 1898 there were 6,042,618 persons insured by sixty-five trade societies; 41,746 of these met with accidents, that is 6·91 injured workpeople per 1,000; in agricultural pursuits the injured men were 4·06 per 1,000. The causes of these accidents among the men injured are given as follows: dangerous nature of the occupation, 44·36 per cent.; carelessness or inattention, 16·49 per cent.; neglect of precautions, 10·50 per cent. Among the women employed the numbers given are: dangerous nature of the occupation, 18·92 per cent.; acting against regulations, 18·60 per cent.; carelessness, 16·64 per cent.; neglect of precautions, 14·19 per cent. The differences in these numbers, especially as to the dangerous nature of the occupation, shows the greatest proportion among men, while the workwomen would seem to be more apt to break rules; greater supervision is therefore required and should be provided. Neglect of precautions on an average causes about 16 per cent. of the accidents, which is still a high percentage, and might be considerably reduced if not altogether avoided by better arrangements.

The time of the day also exercises some influence upon the occurrence of accidents. They are most frequent towards the close of the day when bodily fatigue predisposes to them or when the remaining work which has to be done on that day leads to haste and so to want of caution and its consequences. These accidents also can only be prevented by careful supervision and careful regulation of the work. From investigations as to causal connexion between the accident and the injury a number of new facts have been ascertained about etiology, and we will give a few examples, explaining them in so far as they can be met by prophylactic measures. Perfectly healthy, strong and generally quite robust men sometimes sustain a fracture when at work, which is entirely caused by some definite condition of their work. These fractures mostly occur when a heavy load is being moved and some strong or clumsy bodily movement is made; this cause of fracture is generally met with in men who carry heavy weights upon the shoulder or back. These have nothing in

common with spontaneous fractures, where the bones are affected, and would not have otherwise occurred, so we may assume that the heavy weight supported by the body was the essential condition for the occurrence of this fracture. It is an evidence that a fracture may be caused entirely by muscular action, and we should always warn these carriers of heavy weights of the danger they run when they make the slightest incautious movement.

In connexion with the suggestion we made above, that workmen should from time to time be medically examined, the occurrence of spontaneous fractures is instructive, in cases of tuberculosis, syphilis and tabes. We will select two typical cases from Golebiewski's Atlas, which will show us how such fractures are to be prevented.

In one case a bricklayer thirty-four years of age when lifting a box of lime felt a "crack" in his back. Examination showed the presence of a fractured lumbar vertebra, and the cause was tuberculosis.

In the second case a plasterer forty-six years of age twisted his ankle when carrying half a sack of plaster on his back and sustained a fracture of the ankle, which produced severe disease of the joint. The diagnosis was a fracture of the malleoli, and the cause was tabes.

There are numerous similar cases in the literature of accidents. We need only glance through the chapter on this subject in Thiem's handbook, in which well marked local or a general constitutional disease is given as the direct cause of the accident. If these diseases had previously been diagnosed by medical examination these fractures might have been prevented, quite apart from the fact that in cases of advanced disease heavy work should not be permitted. In tuberculosis of bone, which often runs a very chronic course, much may be done by suitable supporting splints and other contrivances to prevent complete destruction of the joint and its resulting deformities. In syphilis too the workman would save himself much trouble if he did not purposely conceal the disease so long. This is partly also the consequence of that unfortunate regulation which excludes persons suffer-

ing from venereal disease from any help. Yet, when a bone is already affected with tertiary syphilis a small injury often suffices to cause a fracture at that spot, and the workman must be compensated, since he can claim compensation for an accident which has aggravated his previous disease. On the other hand years may have elapsed between the venereal affection and the development of tertiary symptoms, and it may not be possible to prove the connexion between them.

It would take too long to give many other examples of cases which prove the importance of the prevention of these accidents by early examination of the workmen before they think they are ill, but we will give one example to show that this is in the interests of the trade societies also. It is well known that differences of opinion may arise about the traumatic origin of herniae, at least every case is critically investigated in this respect because we never know beforehand whether the workman had a hernia before the accident, and it is often very difficult to determine whether the hernia has been acutely produced or not. Thiem in his handbook therefore says: "Because of the vexed question about hernia it is the duty of the surgeon who has to examine and to treat accident cases to examine the abdomen in every case of injury, without exception, whatever may be the nature of the injury. In this way many useless contentions are avoided, and we urgently advise the directors of medico-mechanical institutions to examine every patient for hernia upon his admission into the institution. This will also prove that the assertion often made by such patients is incorrect when they state that the hernia was caused by the exercises prescribed." This caution would certainly not have been given had not the experience of Thiem and of all other surgeons shown that workmen avail themselves of every chance to assert that the hernia was caused by an accident and thus claim compensation. If surgeons were appointed to examine the workmen regularly the number of these cases of deception would be considerably reduced.

The examination and treatment of persons who have

sustained accidents must be according to the fundamental rules already laid down. The fact that the consequences of an accident must be borne by the society, who value accurately the capacity for work, and whose own interest lies in seeing that the patient has early and adequate treatment, has had very good results, especially in the rendering of first aid. Means of transport for injured persons have marvellously increased during the last few years in large towns, as also has the erection of stations with appliances where the first dressing, which is so important, may be applied by surgeons after a thorough examination has been made, and this should include examination of the whole body. In accident cases many instruments are required, in order that conclusive evidence may be given for the estimation of the compensation. In addition to the ordinary linear measure we need an instrument to measure exactly the range of movements at the joint or the angle of an anchylosed joint or contracted limb; also callipers to measure the diameters of limbs and a dynamometer to determine the grasp and strength of the hand. These exact measurements are very important but should always be accompanied by a minute description of the local condition of the injured part, otherwise they are apt to lead to erroneous conclusions. For example the mere statement that the circumference of the affected limb is reduced or increased tells nothing if we do not add it is caused by oedema, or whether there is muscular atrophy, or whether both conditions are present. We have often opportunities of seeing opinions given where these points are not sufficiently regarded and too great stress is placed upon figures which in these cases are of no value. It is these accident cases which should make the young surgeon, here and to a certain extent in all surgical cases, not only make a thorough local examination, but also a general examination, that he may be able to form a correct opinion about the patient. This is to the advantage of the patient, because the sooner a constitutional affection is discovered the sooner is it possible to take adequate precautions. The doctor who does not make this general examination

before giving his opinion runs also the risk that a later opinion—and there are generally several opinions—will expose his neglect. Our opinion is that most weight should be laid upon an exact record of the condition directly after the injury; in this way only, when he is later called upon to decide whether the consequences of the accident coincide with the complaints of the patient, can the surgeon give an unbiassed opinion.

The after treatment is an important consideration in accidents from which the patient has not recovered by the thirteenth week, or in which the functions have not yet been completely restored. There however we can no longer speak about prophylaxis, and must therefore refrain from entering upon this interesting subject. On the whole our impression is that prophylaxis is somewhat neglected in the treatment of accident cases; yet it opens up a wide field of work which will soon be fully explored.

III. PROPHYLAXIS IN THE TREATMENT OF DEFORMITIES

The oldest records of the history of the art of medicine give us but scanty information about the deformities of the human body. This is due to the widespread custom among ancient races of exposing weakly children or those who showed some defect. But even Galen uses a number of expressions, such as scoliosis, kyphosis, lordosis, and so on, which are still in use today. The first to introduce the term orthopaedics for the art of curing deformities of the body, and incorporated this branch of science into medicine, was Andry (1741). From that time up to the present this branch has been so closely connected with surgery, and so many famous surgeons have worked successfully at the subject, that we need only mention the names of Heister, Glisson, Heine, Dupuytren, Pott, Stromeyer and Little, to justify us in treating this subject here. The tendency of orthopaedics during the last few years has also been in the direction of antisepsis and asepsis, and only thus can we safely undertake osteotomies, tenotomies, transplantation of tendons and operations for dislocation

of the hip. Indeed our most important orthopaedists consider that a thorough surgical education is indispensable for successful work in this field. In regard to our prophylactic measures, it is important to state that by far the greatest number of cases occur during the first decennium, between the ages of one and ten years. We quote here a few interesting figures from the statistics given by Hoffa in his work on orthopaedic surgery. Among 67,919 purely surgical cases in the Munich Policlinic, he found 1,449 cases of deformity; that is a percentage of 2·13, approximately equally distributed among males and females. Ranged according to age the numbers were :—

From 0 to 10 years . . .	602 cases =	41·68 per cent.
From 10 to 20 years . . .	481 cases =	32·32 per cent.
From 20 to 30 years . . .	182 cases =	12·61 per cent.
From 30 to 40 years . . .	70 cases =	4·84 per cent.
From 40 to 50 years . . .	54 cases =	3·74 per cent.
From 50 to 60 years . . .	30 cases =	2·08 per cent.
From 60 to 70 years . . .	28 cases =	1·59 per cent.
From 70 to 80 years . . .	2 cases =	0·14 per cent.

The chief point of interest is the constant decrease in the number of cases with increasing years, and this will be no surprise to us when we remember the delicate soft osseous structures of childhood. The inquiry whether the deformity was congenital or acquired gave the result that 150 cases, that is 11·3 per cent. were congenital; and 1,175 cases, that is 88·7 per cent. were acquired. For our purpose this great excess of acquired cases over congenital cases is important, because in acquired cases prophylactic measures might have prevented them, while we are powerless to do anything to prevent congenital cases, at least those primary or idiopathic cases the causes of which are inherent in the germ of the embryo. In these the external cause is missing, while secondary congenital deformities may arise through some external injury, although in the latter too an important part is played by pathological conditions, such as adhesions of the amnion, foetal rickets, and disease of the central nervous apparatus. Here we can do nothing apart from strict observance of hygiene during

pregnancy, or at most the only treatment possible would be to remove early certain pathological growths of the uterus, which take up room and thus may tend to cause deformities. As regards the inheritance of deformity, Hoffa calculates that there was an hereditary predisposition in about 23 per cent. of all cases, and it often occurred that the deformity first showed itself at the same age at which the disease appeared in the parents. There is reason therefore why we should be even more careful with the members of such families, and should guard the children from all those injurious causes which may give rise to the deformity. Above all, preventive measures must be adopted as soon as possible after birth when a congenital deformity has been diagnosed, in order that increase of the deformity may be prevented. During the first year of life the soft osseous structures still permit of being moulded, and at this early age we can often accomplish much more than we can later with the most complex apparatus. We must utter a warning against the use of apparatus or plaster splints which are kept on for weeks, or even months. The most important point is to bear in mind the general bodily health, and by massage and simple manipulations to counteract the deformity. By this method we prevent atrophy which so readily appears when splints are used, and also that troublesome eczema, which may assume dangerous characters in young children and reduce the general strength. The prognosis in deformities depends mainly upon the time when the deformity appeared, and upon the degree of deformity, but it has been observed in cases where there is an hereditary basis that the deformity may increase after a temporary improvement, and caution is especially needed in these cases where the prognosis seems to be made more unfavourable by the hereditary predisposition. Our main object from the commencement of the deformity should be to restore the correct position by appropriate measures, so that the growing osseous structures may be developed according to normal conditions. It is most essential, especially in deformity of the lower extremities, which constitute a large percentage of all deformities, that

we prepare the deformed feet of the child for its first attempts at walking, in order that the weight of the body may then help to correct the deformity, instead of still further increasing it.

Among acquired deformities we shall for the present omit those primary or traumatic cases which are commonly the result of fractures and dislocations, and shall refer to them later. The secondary so-called "weight deformities" are, as their name implies, developed as the result of the effect of the body weight, or of some other pressure and strain. This shows the direction in which we must work if we would reduce the number of cripples, who it has been estimated number in Germany 500,000 approximately. In this treatment of deformities a wide field of usefulness is opened up to the family physician, which is the more hopeful when we remember, as already pointed out, that the prognosis is far better for cases which have been treated early. In most cases unfortunately medical treatment is not commenced sufficiently early; sometimes because the child's relatives have not noticed the deviation of the shape from the normal, sometimes because the anxious mother really takes the child to the doctor at the very beginning, but goes home consoled with the opinion "the child will grow out of it." Here we must state definitely that spontaneous cure of an existing deformity is the rarest occurrence, and must always be regarded as very exceptional.

To answer the question, how can we best remove these deformities of bones, or better still, how can we prevent them? it is necessary first to be quite clear as to the way in which they are brought about, and the causes which have been at work. It is not our intention to discuss the theories advanced by Hueter and Volkmann on the one side, and by Julius Wolff on the other, but it is at least certain that these deformities are developed under the action of physical laws, and just as the internal architectural structure of normal bones is mathematically according to the laws of statics, so too the internal structure of pathological forms is in accordance with the same laws,

and this explains to us a large number of cases of pathological changes in bones and joints. And when we see the different mechanical causes which injure the osseous development in individual cases, we cannot but assume that there are certain predisposing factors at work in causing these deformities. Among such deformities are those met with in men who work constantly with the body in some faulty position. Thus we meet with kyphosis in men who habitually carry heavy weights, where it is caused by the carrying of such weights; and in bootmakers and weavers, where it is caused by the constant bending forward of the body. Scoliosis is met with in millers and masons, who carry heavy weights upon one shoulder. Genu valgum and flatfoot are seen in bakers and waiters. These deformities due to occupation have been largely ascribed to rickets but without any definite evidence; and genu valgum and flatfoot which appear at puberty have been regarded as a special late manifestation of rickets. Occasionally deformity appears in strong, robust looking children, though as a rule these skeletal changes appear in children who are delicate, weakly and anaemic, who suffer from digestive disturbances, are scrofulous, and have grown very fast. The family physician should use his influence with the parents in order that occupations may not be chosen for them which will favour the appearance of deformities such as genu valgum and flatfoot. All occupations which require long continued standing should be forbidden. In anaemic children we must endeavour to raise the nutrition of the entire body, and to increase the formation of proteids. This is best attained by suitable gymnastic exercises combined with massage and hydrotherapy, and the regulation of diet, which for children should contain much milk; and this is far preferable to the use of iron and arsenic preparations, although in some cases we cannot dispense with the latter. These measures are not enough by themselves, and these children should at school be kept from all influences, such as bad posture in writing and long continued sitting which so frequently lead to deformity. The commonest

deformity set up is habitual scoliosis, which constitutes about twenty-eight per cent. of all cases of deformity, and in the majority of cases is developed between five and ten years. Eulenburg found that among 1,000 cases of scoliosis, 564 cases appeared between the seventh and tenth years of age; that is during the years when, with the commencing second dentition, there is a tendency to increased development of the entire skeleton. Eulenburg calculates that heredity is a factor in twenty-five per cent. among the 1,000 cases; not that these children are born with scoliosis, but the hereditary factor consists in this, that the children are born with a certain relaxation and lack of resisting power in the constituent parts of the vertebral column, and in this condition deformity may later be produced by some slight external cause. The act of writing must be regarded as one of the most important of these causes when combined with the predisposing factors above alluded to, partly constitutional weakness, and partly weakness of the bones themselves, the aetiology of which is still unknown. During late years many school desks have been devised to try to remedy the faulty posture assumed by children in writing. But by this we shall not be able to prevent the tired body from again adopting a crooked position. In addition to school hygiene, and this disease has been called sedentary or school disease, preventive measures should aim at preventing any real tiredness. This can be best done by restricting the number of school hours, and above all by adequate intervals between the lessons, during which the relaxed muscles may be again strengthened by exercise in the fresh air. In addition there should be for both sexes, regular gymnastic exercises acting upon the vertebral column, and strengthening the whole muscular system, and especially the muscles of the back. Gymnastic games are especially beneficial, and have gradually spread from Görlitz to other places. Growing girls should have physical exercise; for example, playing with balls, swimming and skating. Care of the skin must not be neglected, especially of the back, and neglect to cleanse the skin by

friction and baths is still very common among us, but we are endeavouring to remedy this by providing public baths, which put this luxury within the reach of the poorest classes. It is to be hoped that in course of time such institutions will be available free of charge for the mass of the people.

To see whether these endeavours protect our youth against the injurious effects of school, school doctors will be appointed—it is merely a matter of time—and by examining the children several times a year, they will recognize commencing deformities, and the necessary steps will be at once taken to prevent them. And when in the future the changes which the doctors recommend are carried out at schools, and the physical health of these children is not sacrificed to their intellectual development, but the two work harmoniously together, then children will later be equal to their future occupations, and their minds will develop better when their physical health is good than when an erroneous method of education has weakened the body.

Still one other factor in the causation of deformities must be considered, namely rickets, a disease in which a defective deposition of lime salts in growing bones interferes with their proper function. It appears mostly during the second year of life, at the time when active growth of the osseous structures takes place. As a result the bones become weak, and deformity of the skeleton is developed. Rickets is the commonest disease in children, and exists all over the world, though it is much rarer in tropical and subtropical districts than in northern countries. The disease is produced by unfavourable external conditions, and is met with therefore not only among the people in large towns, but also in the country, where the small close damp rooms are injurious to health. But the chief predisposing cause is the faulty diet of children. Sometimes it is improper diet, which predisposes to rickets by setting up chronic digestive troubles; sometimes it is insufficient food. Artificial foods are a very great causative factor, especially when they are used as substitutes for milk diet, as often is the case among the lower classes, and cocoa, coffee

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and starchy foods are given to children. Severe acute diseases are also unfavourable conditions, and congenital syphilis is regarded by many as a causative factor in rickets.

At present we have no statistics showing the number of cases of deformity in which rickets was a cause, but there is no doubt that rickets plays a large part in the aetiology of deformities. Kassowitz found that among 5,000 cases of rickets nearly every case showed more or less clearly the deformity known as "pigeon breast." Among 1,444 cases mentioned by Hoffa, there were 39 cases of rachitic kyphosis, that is 2·07 per cent.; 107 cases of rickety curvature of the leg, that is 7·41 per cent.; and among the 119 cases of genu valgum doubtless a large number had suffered from rickets in youth. Among 859 orthopaedic cases treated by Dollinger there were 72 rickety curvatures of the leg, or 8·4 per cent. According to Guerin, rachitic scoliosis occurs in 9·7 per cent. of all rickety children.

To ensure a proper diet for children during the first nine months of life is the best prophylactic measure against rickets which a doctor can take. The child should not be overfed, and the breast should be given in accordance with the well known rules. Unfortunately the artificial feeding of children is becoming more and more common, even among the poorer classes, and we should make every effort to see that children are breast fed, especially when no contra-indication exists. If artificial feeding cannot be avoided, cow's milk is the best substitute for the breast, and should be given mixed with varying proportions of water or of veal broth, according to the condition and age of the infant. All other methods of artificial feeding should be avoided, especially when rickets already exists, and also the addition of much sugar or starch. Special care should be given to the digestive organs, because chronic dyspepsia and intestinal catarrh which have existed for long, either cause rickets or aggravate the disease if it already exists. The distended abdomen of such children points to the meteorism which is never absent in rickets and to the habitual constipation. These children should be much out in the fresh

air, and to prevent curvature of the spinal column, should not be carried on the arm, but lie on a horsehair mattress. General massage of the body is very useful for these digestive disturbances, when it is combined with washing in cold water and friction. By this method the skin is maintained in a good condition. Baths may also be used with the addition of brine or of Kreuznach salts, or of some of the well known salts of Orb, Kösen, Stassfurt, or Sodenthal. By these baths a derivative action of the skin is obtained, and the skin should become red if the proper effect is to be obtained. If circumstances permit these children should be sent to a place where there are brine baths, or still better where there are sea baths. Associations exist to provide such a holiday for the poorer children, and this is spreading from year to year, though much more still remains to be done in this direction. Homes for cripples, which have been established during the last decade, are also most useful; but these cripples are to a certain extent cut off from the rest of the world, and they are apt to feel that they are looked at askance; and this gradually leads to a bitterness in their character.

To prevent such deformities by carrying out the general principles sketched above is the most grateful task of the surgeon, especially when we remember that in spite of great advances made in the last few years and of the introduction of mechano-therapy, a well marked deformity often takes years to cure, and it may even be impossible to restore perfectly the normal form of the body.

IV. PROPHYLAXIS IN THE TREATMENT OF TUMOURS

Cohnheim's sentence, "If there is one chapter in our science which is still veiled in darkness it is that of the aetiology of tumours," is still true today, and we are still unable to say what is the real cause of carcinoma and other tumours, though much work has been done in this subject. Yet it is a consolation that we have learned certain of the predisposing causes of carcinoma which are constantly met with, and have therefore caused us to attach much

importance to them. We mean the mechanical and chemical injuries connected with certain occupations. The best known are the tar cancer and chimney sweepers' cancer among workmen at the tar and paraffin industries and chimney sweepers. We will give a few other striking instances of the aetiological significance of irritation leading to chronic inflammation upon the occurrence of carcinoma. Bottini mentions 100 cases of cancer of the tongue which he had observed (including three cases in women) which were all caused by smoking and chewing of tobacco. H. Zinker found gall stones in 84·5 per cent., and Birch-Hirschfeld in 91·7 per cent. of cases of primary carcinoma of the gall bladder, and these stones are known to give rise to irritation and inflammation.

If we glance through the statistics of cancer of the breast by Winiwarter and Oldekop we find that in 125 out of 934 cases some trauma had occurred—that is in 13·4 per cent. of the cases. Unfortunately the many sources of irritation, especially of internal organs, can only be prevented if we remove early enough the condition, which we know may in course of time lead to the development of a malignant growth.

Every form of benign tissue-hyperplasia, such as congenital naevus, papilloma, atheroma, adenoma, gumma, may, if exposed to constant mechanical or chemical irritation, pass over into a carcinoma, though we cannot say the exact time when the change began; scars too of very various origin are a favourable soil for malignant tumours. According to Rapock 182 out of 399 cases of carcinoma of the skin arose from warts. It is these occasional causes which we must oppose with all the means at our disposal. We must advise the removal of benign tumours, especially those which show even the very least tendency to increased growth or which are situated in places where they are exposed to constant irritation. We must warn against the scratching of warts, and against cutting them with septic knives, and should see that sharp pieces of teeth and bad teeth are removed. In chronic states of irritation of the mucous membranes we must forbid smoking and chewing of

tobacco, and above all the abuse of alcohol, which experience has shown us gives rise to carcinoma of the oesophagus and of the stomach.

We must point out the dangers of the pressure by corsets, which are a cause of mammary cancer and of obstruction in the portal circulation, and may tend to the formation of gall stones, the causal significance of which in the development of malignant tumours has been mentioned above. Chronic eczema of the skin should be carefully treated, and workmen in tar and paraffin factories and chimney sweeps should be warned of the danger which threatens them. It has been shown that congenital phimosis tends to the development of cancer, and early operation should be recommended. An endeavour should also be made to heal old ulcers of the leg, which often afford a favourable opportunity for the development of carcinoma.

When we review these occasional causes the question rises in our minds, How is it to be explained that the number of cases of malignant tumours is small compared with the frequency of the occurrence of the irritations and injurious effects mentioned above? This is a problem which the theories of Virchow, Cohnheim, Waldeyer, Grawitz and Klebs have not yet solved. This is not the place to discuss these theories, yet we must refer to one factor which has perhaps hitherto not received sufficient attention—the heredity of carcinoma, or rather the disposition to it. To give a few statistics, according to Winiwarter 6 per cent. of the cases of carcinoma are hereditary; according to Bräutigam, 8·5 per cent.; according to Pfeiffer, 9·3 per cent.; and according to Ziel, 11 per cent. In Ziemssen's "Handbook of Pathology and Therapeutics" 192 out of 1,137 cases had a family history of cancer. And though we confess that the heredity cannot always be proved in a family and that little weight can be placed upon the statements of patients when medical information is not forthcoming, yet we cannot but regard heredity as an aetiological factor, and in families where there is this hereditary taint the greatest care should be taken to avoid all the injurious conditions and occasional causes described above.

While we know so little about the real cause of tumours, we shall not be able to do much to prevent them in spite of all our efforts. In the present state of our knowledge we can only successfully combat the disease by removing every benign tumour as soon as possible, since it is possible a benign tumour may become malignant, though it is impossible to tell when the change began or what caused it. The next question that arises is whether it is possible today to remove a malignant tumour so completely by operation, and without danger to life, that we may feel sure it will not spread or recur.

To answer this question we take the statistics of cases in which cure is assumed to have resulted when, as Volkmann teaches, no recurrence has appeared within three years. Although we know that occasionally recurrence has been seen after five to ten years, yet this is after all so rare that for practical purposes and in dealing with large figures, an interval of three years may be taken to denote probable cure. We select for this purpose that part of the body which is most accessible and has therefore been most thoroughly worked out, the female breast. How widespread carcinoma of the breast is, may be judged from the following figures taken from Heimann. Of 1,234 operations on the breast, 1,110 were for carcinoma, and only 124 for other tumours.

The essential conditions for a perfect cure are an early operation and the removal of all the diseased tissue. The history of mammary amputation is extremely interesting in this respect, and figures prove that the number of cases cured by the operation has increased according as investigations have advanced showing us the path along which it spreads and enabling us to remove this diseased tract. The stages have roughly speaking been the following: extirpation of the tumour itself; amputation of the breast; clearing out of the axilla; removal of the pectoralis major muscle. At the Congress of Surgeons in 1883, Küster pointed out the importance of always clearing out the axilla and introduced the method. After further experience Heidenhain's book appeared in 1889, and he recom-

mended that in some cases the pectoralis major should also be removed; his researches showed the path along which mammary cancer spreads, and that local recurrence proceeded in most cases from cancer cells which had been conveyed by lymphatic vessels into the muscle itself. Following his suggestion, a number of others, for example Helferich, Rotter and Halsted have carried out this method of breast amputation, and their results, when compared with those previously published by the best operators, testify to the excellence of the method. That what we have most to fear is local recurrence is proved by numerous records of earlier years. Those of Hans Schmidt show that among 95 cases of recurrence, 71 were local, that is 74·4 per cent; and Rotter found 30 such local recurrences among 34 cases, that is 88·23 per cent. Statistics collected by S. Gross show that on an average the best results of former years give 66·8 per cent. cases of local recurrence, while the average among the results of Halsted, Rotter, Cheyne and Helferich give only 30·3 per cent., or less than half the former. Another important point to consider is whether the greater extent of the operation has increased the danger of it. In regard to this, recent years show very favourable results, and in 125 consecutive cases published by Weir, and 76 by Halsted and May only one case of death occurred, and this was ascribed to the ether, while Dennis had one fatal result among 74 cases and this patient suffered from haemophilia. It is obvious that with extensive tumours there are limits to successful operation. We confess that it is hopeless to think of operation for a "cancer en cuirasse," neither would a judicious surgeon operate when there were already signs of pleuritic irritation. For these inoperable cases there remains the possibility of attempting a cure by injections of bacterial virus, although the results are not very satisfactory. Friedrich writes about these attempts which he carried out under Thiersch: "With streptococci and mixed culture sterilizations and filtrates, cure was not obtained when these were injected into the tissues of the tumour, whether carcinoma or

sarcoma." When however both doctor and patient are convinced of the hopelessness of any operation, the patient may be advised to try this method. It is these hopeless cases, where operation is impossible because of the extent of the local growth, which point again to the importance of early operation for such cases. In general we may say that the earlier the tumour is removed the less extensive will be the operation and the greater the chance of a cure. We must therefore make a diagnosis early, and there are many cases in which this is possible. One symptom should be specially borne in mind, which is important in malignant tumours; this is haemorrhage, and it appears comparatively early. In every case of haemorrhage from the rectum or vagina, we should ascertain by palpation whether there is any special cause for it, and we must not hesitate to make a vaginal examination, even though it possibly turns out to be only menorrhagia or haemorrhage from haemorrhoids. In haemorrhage from the stomach too one should avail oneself of every possible means of diagnosis to avoid a mistake in this difficult matter of the differential diagnosis between simple ulcer of the stomach and carcinoma.

A second symptom to which great weight should be attached is emaciation, which is often so marked in comparison with the small size of the tumour that we cannot but assume that serious nutritional changes are present, and above all a change in the condition of the blood though up till now no such change in the blood has been detected. This loss of flesh is the more remarkable when there has been no loss of blood and when the digestive organs apparently still work well, and when we remember how commonly haemorrhages exist for years in women without leading to any real disturbance of nutrition. On the other hand, emaciation with malignant tumours may be regarded as the precursor of cachexia which with certainty appears when the tumour has not been removed. If the tumours are situated near the surface or upon an osseous structure, as is the case with most sarcomata, then it is palpable and more easily accessible, yet nevertheless it

may present great difficulties in diagnosis. In the Röntgen rays we possess an additional means of diagnosis, yet here much depends upon the correct interpretation of the photograph, and it will need some years of experience before we can interpret skiagrams correctly and thus reduce the number of errors. The difficulties which depend on the obscurity of the origin of tumours have stimulated our most eminent inquirers to renewed research, and we cherish the hope that these great endeavours will prove successful in throwing some light upon the subject.

Prophylaxis in the Diseases of Women

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Prophylaxis in the Diseases of Women

When we consider the prevention of the diseases of women from the standpoint of their aetiology, we are led in almost every case out of the narrow range of gynaecology into the wide field of general internal pathology—far more indeed than is the case when these diseases are considered with regard to their symptoms and pathological anatomy. When the diseases of women are considered aetiologically, the close connexion which exists between the sexual system and the whole organism becomes more clear: the latter appears no longer so definitely controlled by the former, but the two seem rather to exercise a peculiar mutual influence upon one another, such as we meet with in the case of no other subordinate organ.

Briefly I might express it thus: not only in consequence of the influence of the sexual system, but also because of the sexual functions, there arise through the action of the central nervous system of ill developed individuals disturbances of the whole organism, which in a "vicious circle" react on the organs of generation.

Among these disturbances, for example, I would put first the anomalies of menstruation and their associated phenomena, such as chlorosis, anaemia, gastro-intestinal disturbances, anomalies of micturition, diseases of the skin and anomalies of perspiration, hystero-neurasthenic attacks and other neuroses. Next I would place those conditions of relaxation and of congestion of the pelvic and abdominal organs which have been produced, not by primary local infective inflammations, but by disturbances in the innervation of all the contractile elements of the generative organs

and of their ligamentous and subperitoneal connexions in the pelvis, principally therefore of the muscular tissues including the muscular fibres of the blood vessels. This "want of tone" leads in part to the production of descent and of prolapse of the uterus, of the vaginal walls with the bladder and rectum, and of the ovaries, and further to general enteroptosis. It leads also to retroversion and flexion of the uterus, and sometimes to chronic hyperaemia, and thus to vascular and lymphatic engorgement of all the abdominal viscera; and when there is at the same time a want of tone of the abdominal wall, it gives rise to distension of the intestines. Remoter results of this hyperaemia are various inflammatory conditions not produced by any primary infection: these are certain forms of chronic metritis, cystic degeneration of the ovaries, and possibly also the formation of fibroids and glandular cysts.

Almost without exception we find in such individuals other signs also of general neurasthenia and of irregularities of metabolism, which usually appear first at puberty or which become much more marked at that period. It is therefore clear that the influence is mutual and not one-sided. And it is here that "preventive treatment" has a wide field, which is recognized often neither by the public nor by the physician, and this preventive treatment is of value not only for the patient herself but also for her offspring. Prophylaxis is especially useful in these cases, because these slowly progressive functional disorders lead at last to structural changes, and thus make it almost impossible to restore by treatment the normal condition of the organs.

Taking the pathology as the basis of classification, we will consider the preventive treatment of the diseases of women and of their sequelæ under five heads—

I. Abnormalities of growth and arrests in development.
II. Changes in form and in position.
III. Inflammations and disturbances in nutrition.
IV. Injuries.
V. New growths.
VI. Gynaecological operations and procedures.

In each chapter will be set forth in order the preventive treatment of—

(*a*) The primary cause or predisposition to the disease.

(*b*) The exciting cause.

(*c*) The sequelæ, including complications arising out of pregnancy.

(*d*) The results of typical errors in the treatment of the disease.

I. Abnormalities of Formation and Arrests in Development

In so far as the defects in development are congenital, their aetiology lies in the yet obscure region of general teratology, and of this we only know that it includes several utterly different causes. In the first place there are diseased ova analogous to degenerate spermatozoa and due to poisoning by lead, mercury, alcohol and morphine. Further diseased conditions of the decidua, primary or secondary, may at the same time give rise to disease in the foetus and produce abnormalities in growth or inflammatory adhesions. Congenital malformations may also be caused by general as well as by local infective disorders such as influenza, tuberculosis, syphilis, and gonorrhoea. Disturbances in nutrition are probably also produced by the toxins of these diseases, by pyrexia and by obstruction to the circulation, as in disappearance of the liquor amnii in the first six months and adhesions between the embryo and the membranes, and subchorionic haematomata. The more chronic these influences and the longer they have been at work, the more likely is it that the child will live but will be deformed. But under what special circumstances these causes act upon the embryo so as to produce deformity is still entirely beyond our knowledge.

In the female generative organs deformities are very often met with; on the whole malformations are most frequent. The abnormalities of the uterus and of the Fallopian tubes in children who are otherwise healthy must

arise from a simple arrest in development of both or of one of the ducts of Müller, and thus are produced the uterus bicornis and unicornis. Here preventive treatment is limited, and it can only be suggested that mothers and those who will become mothers should be healthy, and especially that all chronic disorders of the sexual organs should be treated. The same holds good for the father. Those who have tuberculous disease of the genital organs should not marry.

But far more important to the physician is the preventive treatment in cases where congenital malformations already exist. And this will depend upon the period of life reached: at birth, at puberty, before marriage, after marriage, during the first pregnancy, during labour, and with regard to the question of subsequent pregnancies.

1. In complete absence of uterus and vagina it is generally advisable not to marry; so too when there is a rudimentary vagina, because coitus will increase the molimina menstrualia if the ovaries are present. The continuance of menstruation may be prevented by removal of the ovaries. Unhappiness in marriage may result from the incapacity to fulfil the physical functions, and in such cases the construction of a vagina-like cul-de-sac is followed with partial success.

2. In atresia vaginae with a well formed uterus and ovaries, a vaginal passage should be made. The same holds good for diaphragmatic or cord-like atresia of the cervix, vagina, hymen, or vulva; and this should be done partly to prevent sterility and partly to prevent the difficulties connected with menstruation and with childbirth.

3. In cases of pseudo-hermaphrodism an attempt to determine the sex should be made, but this is often not possible till puberty with its well marked sexual inclinations. We may be guided by the knowledge that most pseudo-hermaphrodites have been proved to be males, and several of them have been capable of procreating, and this is the more likely to be the case the better the genital protuberance is developed and when the catheter shows that a cul-de-sac exists in the posterior wall of the urethra. In

female pseudo-hermaphrodites atresia of the vagina is always found.

4. Congenital recto-vaginal or recto-vulval fistulae should be treated early so that, apart from the considerations of cleanliness, no infection of the genital canal from this source shall arise during childbirth.

5. Of more frequent practical importance is the preventive treatment in cases of uterus unicornis and bicornis and septa in the vagina and uterus, considered in relation to generative processes.

If in weakly individuals amenorrhoea exists as a complication of this malformation, marriage should be avoided; conception very rarely occurs. In the married, septa should be divided to prevent difficulties in childbirth. Such may arise too from a hymen stretched tensely across the orifice. If conception has taken place, we must act according to the rules given in the section on Obstetrics.

6. In regard to the presence of a third ovary, it must be mentioned that if oöphorectomy is undertaken as preventive treatment for menorrhagia from a fibroid or other cause, the possibility of a third ovary must be borne in mind so that no failure may result.

Far more successful are the measures which preventive treatment can bring to bear upon the abnormalities of formation during childhood and at puberty.

Preventive treatment in the infantile condition of the genital organs should aim, before marriage, at improvement of the entire general constitution; local treatment should generally be resorted to only after marriage. The general treatment should not be restricted to combating the chlorosis and anaemia, or to allaying a chronic dyspepsia, but should embrace a régime which will raise the tone of and strengthen the entire physical and mental life. Hysteria and neurasthenia, dyspepsia and chlorosis should be overcome by a well regulated mode of life, regular and not too fatiguing work, eight to ten hours of sleep and early retiring to bed, five meals a day of easily digested food, moderate exercise calculated to strengthen the muscles, every morning bathing with cool water of 80° F., 70° F.,

or 65° F., according to the state of nutrition, the avoidance of mental exertion and of amusements which excite the imagination and burden the memory. In place of these, the wholesome mental influence of a simple family and home life, the avoidance of all wine, beer, tea, coffee and spices, while chocolate and sweetmeats should only be allowed exceptionally as dainties. The choice of recreations and amusements should be restricted to simple ones which do not excite the senses and the imagination, while the desire for work and the sense of duty and training in self control should be aroused—in short, the causes of effeminacy, of eccentricity, and of hysterical attacks should be removed. In general such patients are deficient in bodily heat, and therefore it is a mistake to use strong measures to try and fortify them against cold, or to dress young and delicate children in clothing insufficiently warm.

Hydropathy may be of value if we select applications which are not too stimulating. So too general and special massage of the abdomen and the thighs. In the summer at least six weeks stay in the country, or better at the seaside, or at some elevated district with pine forests. Along with this drugs should be given. Firstly those containing iron, such as haemalbumin, pilula ferri, ferratin, liquor ferri manganatis saccharatus, haemol and haemogallol, Blaud's pill, and *per rectum* alkarnose is the best form. Then stomachics and tonics such as tinctura cinchonae, nutrol, chloralbacid, acidum hydrochloricum dilutum and liquor arsenicalis. For very neurotic anaemic girls the Weir-Mitchell and Playfair treatment is suitable. Special treatment is needed for certain definite symptoms such as dysmenorrhoea, scanty menstruation and amenorrhoea, or menorrhagia with anaemia. It is a question essentially of regulation of the blood supply, and can be accomplished by the general measures before mentioned, be the case one of scanty menstrual flow or of menorrhagia. As additional treatment for delayed or scanty menstruation must be mentioned foot baths *before* the cessation of the period. The footbath may be ordinary hot footbaths reaching to above the ankles, or a footbath in which the feet are immersed

alternately in water of 65° F. and of 104° F., with or without the addition of salt or mustard; then massage or water compresses on the lower extremities and abdomen, warm hip baths and warm full baths, and mustard leaves upon the inner surface of the thighs. For dysmenorrhoea the same line of treatment is required with hot fomentations and enemata. For habitual menorrhagia the treatment before the period should comprise a cold water compress on the abdomen and mustard leaves over the hepatic region, and during the intermenstrual period the above mentioned general treatment.

Remedies in addition to iron and tonics which act well in all these cases by regulating the blood supply are ergotin, stypticin, which is also a sedative, and especially in cases of menorrhagia the fluid extract of hydrastis given several days before the expected period. The same result may be quickly and effectually attained by a prolonged use of calcium hypophosphite or of sodium iodide in increasing doses, or the rectal or subcutaneous injection of a 2 per cent. gelatin emulsion, or a 3 per cent. solution of sugar.

In the married, local preventive treatment is more important and may be recommended without hesitation: hot vaginal douches of salt and water or of infusions or mucilaginous sedatives, the patient being in the dorsal position. For dysmenorrhoea with scanty menstrual flow, dilatation and stretching of the cervix by plugging or by tents, several times and always at least one week before the menstrual period, with strict asepsis and with after treatment according to the directions already given.

I have repeatedly seen sterility quickly cured by this treatment; with the cessation of dysmenorrhoea, the vaginismus simultaneously disappears.

Menorrhagia and the tendency to early miscarriage, which is apparently combined with this condition, may be cured by curetting, after dilatation of the cervix, if the disease has already existed a long time, or by the internal application of steam (atmocausis). If all other methods have failed, the latter may be used in the unmarried also

for severe and otherwise incurable dysmenorrhoea, the cervical canal should be sufficiently dilated and protected from the hot tube by some material whlch is a bad conductor of heat, such as gauze; the temperature must not be higher than 105° C. (220° F.) and the steaming must not exceed a quarter of a minute.

By these hot vaginal irrigations and by the use of tampons to produce dilatation an increased flow of blood is first of all established, whereby the organ is increased in size, as can be shown by palpation, and its form and consistence become more normal, the sharp angle of flexion which otherwise would gradually become firm and hard disappears, the body of the uterus comes to lie more in a line with the cervix, the wall of the cervix becomes softer and the os uteri remains wider. In this way several factors which tend to sterility are removed, and the endometrium doubtless undergoes changes since its functions are improved. Direct experiments to prove this are wanting.

It must be briefly stated that preventive treatment against sterility should extend to the male and should be directed, on the one hand, against neurasthenic conditions, and, on the other hand, against malformations of the penis such as epispadias and hypospadias, and inflammatory or traumatic strictures and prostatic enlargements.

II. Changes in the Form and Position of the Generative Organs

It is desirable here to distinguish four groups; symptoms connected with the uterus are generally the most prominent, as the uterus forms the largest part of the generative organs.

1. Herniae. 2. Descent or prolapse. 3. Inversion of the uterus. 4. Pathological malpositions, versions and flexions of the uterus. The pathological malpositions are displacements forwards, backwards or to either side of a uterus which is normal in form and in its inclination to the pelvic axis; whereas in "versions" the uterine axis is inclined to the

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pelvic axis at an abnormal angle, generally backwards; and in "flexions" an abnormal angle of flexion exists between the body of the uterus and the cervix, thus the relation between the component parts of the uterus is changed.

1. PREVENTIVE TREATMENT IN HERNIAE

is that of herniae in general, especially the avoidance of everything that will permanently weaken the abdominal walls and tend to increase the intra-abdominal pressure.

For our purpose we must keep separate three groups; (*a*) in which parts of the generative organs form the hernial contents, for instance a horn of a uterus bicornis or a uterine appendage in an inguinal hernia; (*b*) in which some part of the generative organs forms the hernial sac, as in ovariocele and enterocele vaginalis and hernia labialis; (*c*) reproductive processes are the exciting cause of a hernia in some other region, as in umbilical, inguinal and femoral herniae, which are predisposed to by pregnancy, or caused by parturition, or result from the removal of tumours by abdominal section. Of these group *b* belongs to the inversions or prolapse of vagina; and the labial herniae belong aetiologically to group *c*. It is rare to find parts of the generative organs as hernial contents, and in these cases malformations generally play a part, as in pseudo-hermaphrodism and uterus bicornis; indeed the tendency to hernia may exist from birth together with a tendency to prolapse of the uterus and vagina and rectum. It requires then only some exciting cause to force a passage through the hernial orifice. Such predisposition may be reduced by systematic moderate exercise of the abdominal muscles, regular action of the bowels and urinary bladder, and especially by massage and suitable gymnastic exercises.

In some cases the complete formation of the hernia will lead to troublesome and dangerous consequences, as when an abnormally short round ligament draws the ovary or uterine cornu into the hernial orifice. The menstrual troubles may then become unendurable; and when impreg-

nation has taken place the ovum may become lodged in the hernial sac or the herniated uterine cornu, instances of both of which have been seen by the author. This may be prevented by timely closure of the hernial orifice, generally an inguinal one, with or without removal of the hernial contents. If some freely movable part is concerned, reduction of the hernia must be followed by use of a truss to prevent the troubles and dangers mentioned above.

As every increase of intra-abdominal pressure predisposes to hernia, so especially will pregnancy and tumours of the ovary or uterus. Pregnancy predisposes chiefly by frequent recurrence or by the presence of hydramnion or of twins, when there exists some corresponding predisposition or when prophylactic treatment has been neglected. This prophylactic treatment consists of suitable exercises of the abdominal muscles, support of the abdomen by a suitable belt or bandage when the uterus or tumour approaches the umbilicus, or the removal of the tumour before this.

Preventive treatment is most important during the puerperal period: a uniform compression of the abdomen by a bandage which may be aided by pressure by a weight, but the weight pressure must never be employed alone, as one so often sees, because the intestines are thereby forced to the sides and the abdomen is pressed flat. A gentle aperient may be given on the third day, and if the abdominal wall is flaccid, and disease of the generative organs can be excluded, massage of the abdomen may be performed, not only to stimulate the action of the intestines and the circulation of the blood, but also to raise the muscular tone of the abdominal wall and reflexly to increase the blood flow to the mammary glands. Suckling is an important regulator of the involution of the pelvic organs and of the abdominal wall; it must be emphasized that too little patience is in this matter generally evinced by the mother and by the nurse, and also by the doctors. Sometimes it is possible only after several weeks to bring about a regular and sufficient milk supply. On the day this was written there came to the writer a woman, thirty-two years of age, who had been delivered of her third child by forceps seven

weeks before, and who at my urgent request—she was engaged in business and had not nursed her first two children—had for four weeks perseveringly tried to increase the flow of milk, and in consequence the milk had increased to a sufficient quantity. But usually the attempt is given up after a few days, through impatience. In addition to abdominal massage, somatose and plasmon, which consist of the proteïds of milk, may be recommended for this purpose, though the author has found them useful in increasing the flow of milk also.

For meteorism of the intestines, bitters, oil of peppermint and mucilaginous or peppermint enemata are of service.

If the hernial orifice is already large, it is desirable immediately after delivery to apply a truss, and for this purpose the English truss is better than the German one, even during pregnancy. During pregnancy the uterus usually impedes the passage for the intestine, even though the hernial canal is dilated; in the puerperal period, on the other hand, the wide opening is suddenly uncovered and exposed to the full abdominal pressure. Confinement to bed for too long during the puerperium is as injurious to the patient as getting up too early, because the muscles become relaxed; on an average ten to twelve days is most suitable. Heavy lifting and hard work should be altogether forbidden, and systematic exercise of the abdominal muscles must be recommended. Very thin patients should be fed to develop a thicker panniculus adiposus.

The same holds good for the care of the abdominal wall before and after abdominal sections. From carefully compiled statistics obtained by examination of patients who had previously undergone an abdominal section, Abel has drawn the conclusion that the subsequent formation of herniae in such patients is generally the fault of the operator, and is due to inexact sutures, pressure necrosis, subcutaneous abscesses, or the inclusion of fat lobules between the wound surfaces. While acknowledging the correctness of much of Abel's work, yet there are cases which have already in them a predisposition to the formation of herniae, and in these deficient tone of the abdominal muscles plays

the chief part. Therefore exercise of these muscles and careful suturing must be used, but too many ligatures should not be employed.

2. THE PREVENTIVE TREATMENT OF PROLAPSE OF THE INTERNAL GENERATIVE ORGANS

Here too we must distinguish between the preventive treatment of the primary cause or predisposition to the descent, of the exciting cause, and of the sequelae.

With regard to the primary cause, the prolapse may be congenital; this is very rare. I found one such case in the Munich Frauenklinik, in a child with a lumbo-sacral meningocele; a second case I saw in the Heidelberg Frauenklinik. In literature I knew then of only one case by Qviesling; several others have since been published, and some with spina bifida as in the case mentioned above. The causal connexion which possibly exists between the spina bifida and the incomplete prolapse produced by excessive hypertrophy of the cervix was first pointed out by Winkel; in other similar cases there is, as a matter of fact, a congenital prolapse of the whole uterus.

I mention this aetiological possibility here because it is not at all improbable that disturbances of the central nervous system, especially of the lumbar part of the spinal cord, are the immediate cause of the appearance of these lumbo-sacral symptoms in all relaxed conditions—muscular as well as vasomotor—of the ligamentous and fascial structures of the pelvis, of which prolapse of the uterus and vagina represents the final stage. To treat these specially is beyond our knowledge and our skill. Here too we fall back upon the treatment of the general neurasthenia, and upon prevention of over stretching of the elastic ligamentous structures, and upon the restoration so far as possible of the former elasticity after any severe stretching. This stretching may occur in pregnancy, or after the cervix has been drawn down for operations, or it may follow heavy lifting or sudden violent falls upon the buttocks.

The general neurasthenia which here shows itself locally as a disturbance in innervation, in the form of diminished

tone of all the elastic elements, including those of the vessel walls, is to be treated by the measures already given under "Infantile conditions of the Generative Organs," and under "Herniae," for improving the tone and vigour of the body. By these measures we remove too the symptoms which are in part concomitant, in part reflex.

The knowledge that a relaxed condition of the pelvic floor allows of the completion of a prolapse which had commenced through the yielding of the ligaments and of the subserous parietal pelvic tissues, suggested the idea of using gynaecological massage and resistance exercises to raise the tone of the pelvic floor. The results have unfortunately not been encouraging, yet as adjuncts these methods need not be despised.

The first result of relaxation of the ligaments is retroversion of the uterus; and this may appear even in young girls, but most frequently begins at the first or second confinement when there is a corresponding predisposition to it. When once the uterine axis comes to lie in the same direction as the vaginal axis, especially when there is a ruptured perineum or the legs are rather wide apart and the body is bent forward—then a sudden increase of abdominal pressure, as in heavy lifting or a sudden violent fall, suffices to bring the uterus to the vulva, giving rise to acute prolapse. In the posture described, the musculature of the perineum together with its fasciae is relaxed. If then the physician discovers a retroversion of the uterus or a defective perineum, he should prescribe suitable precautionary measures and advise immediate plastic repair of the perineum.

Retroversion brings with it, not only the risk of prolapse of the uterus, but is indeed the first stage to it; in most cases however this fortunately leads only to a slight degree of descent so long as the functions of the pelvic floor are normal. It may be suddenly lost by too early and severe abdominal pressure in labour, or by too long continued impaction of the head, or by too sudden stretching by leverage and traction with forceps. If the head has only just passed the os and the perineum is still undilated and extract

tion is indicated, it is best first to introduce a large-sized dilatable indiarubber bag, or if there is not time enough for this—and it takes some minutes—then make a deep lateral perineal incision through the sphincter vaginae and levator ani of one side, and immediately after delivery bring together the edges of this incision after careful cleansing by deep catgut sutures.

The most appropriate time for preventive treatment of retroversion and of descent of the uterus is during the puerperium, because on the one hand at this time the foundation for subinvolution of the uterus and ligaments is most frequently laid, and on the other hand the genitalia are most plastic at this time and can, as it were, be better moulded by suitable treatment. We must remember that it is by no means most common for these processes of descent to start from the uterus, but rather that the first stage of it belongs to the vagina. Descent of the anterior vaginal wall is the most frequent; and is followed by descent of the adjacent part of the bladder, and the uterus is then drawn down. Prolapse of the vagina thus leads to cystocele; and prolapse of the posterior vaginal wall to rectocele. Prolapse of the posterior wall may bring about a prolapse of the organs contained in the pouch of Douglas, and may give rise to serious obstetric complications, and these should therefore be replaced beforehand or removed.

All these processes of descent may easily be prevented during the puerperal period by the use of pessaries. These should be introduced at the end of the first week with the strictest aseptic precautions. Broad rimmed smooth celluloid or vulcanite pessaries should be used, never porous elastic indiarubber rings, which might injure the delicate hyperaemic mucus membrane or by absorption of lochial discharge become a nidus for bacteria. The shape should be oval, and slightly concave towards the symphysis; or when there is a tendency to retroflexion, the S shaped or Hodge pessary with a very broad bar for the posterior vaginal vault may be employed.

In such cases the perineum often sinks down and the vagina threatens to prolapse; they should then be sup-

ported during involution by a T bandage, firmly applied. When a tendency to retroversion of the uterus is known to exist, the patient should be kept in the lateral position as much as possible during the puerperium. Too early getting up, that is before the fourteenth day, or too long a confinement to bed, that is after the third week, and too early hard work and heavy lifting should be forbidden.

The patient should be seen once a week till the next menstruation, so that as the involution of the vagina proceeds smaller pessaries may be substituted. The round Meyer ring pessaries are of no use because of their form, since, according to my observations, they produce eversion of the lips of the os of the soft puerperal uterus; then the cervix sinks into the ring, and there arises a dragging on the cervico-vaginal muscular fibres, which pass on the one hand to the vaginal wall, and on the other hand radiate fan-like into the lips of the os uteri; and hence the eversion occurs. There are no purely circular or oblique muscle fibres to offer a more effective resistance than the elastic fibres are able to do. We must therefore not only with the puerperal uterus but with every relaxed uterus, especially when there exists lateral laceration of the os, be very cautious in the use of perfectly circular and thick brimmed pessaries with small lumen; oval pessaries are better. The most rational treatment is a fixation operation and a perineorraphy.

The vasomotor tone may be improved by the administration of ergot and by hot vaginal douches several times daily, or by irrigations with cold and hot water alternately (60° to 70° F. and 108° to 115° F.). Gynaecological massage acts quickly, but cannot be used till after the lying-in period. The combination of pressure and heat by a vaginal "thermophore" is useful; the temperature of the sodium acetate contained in it reamins constant for hours.

Prolapse of the vagina wall alone occurring after labour is not seldom combined with incontinence of urine, and is most successfully treated so as to prevent further prolapse by astringent tampons, such as glycerine of tannic acid or a ten per cent. solution of aluminium acetate. A third

preventive measure in the puerperium is the suturing of a rupture of the perineum directly after the third stage of labour. The sooner and the more exactly the sutures are inserted, the more likely is primary union to occur. The surfaces should be properly fitted one to the other; this is especially important in the frequent lateral tears. The vaginal rent must be sutured in its whole length, otherwise the healing of the perineal wound may be prevented by the penetration of lochial discharge. The deep catgut sutures must pass deeply below the wound, but they should be only few in number so that there may not be too much material to be absorbed. The points of entry and of exit of the stitches should lie near the edge of the wound, but the needle should pass far into the neighbouring tissues.

The after-treatment must not be too active. The wound should be sprinkled with an antiseptic powder—I prefer airol or nosophen—or some airol paste, which softens on the skin, should be carefully applied. With due cleanliness and when the lochia are normal, catgut or silk is as good a material for sutures as celluloid thread, silkworm gut or silver wire. Non-absorbable sutures should be removed at the end of the first week.

If primary union fail, or the physician is not called to the patient till the second or third day, it is advisable to wait, and the plastic perineal operation should be undertaken six or eight weeks after the confinement. Secondary suturing of the granulating surfaces after paring is generally more or less unsuccessful. Sometimes a small abscess may then form, which in favourable cases opens at a spot between the vaginal and perineal sutures, but which, should it become larger, may cause troublesome fistulae (recto-vaginal or perineo-vaginal).

Long continued infective inflammations and frequently recurring pregnancies bring about conditions in weakly patients exactly similar to those caused by puerperal subinvolution: immediately after normal childbirth the anterior lip of the os uteri may be felt immediately within the vagina. Through long continued infective inflammations the vessel walls gradually lose their tone; this occurs both

in the uterus which has been thickened by metritis and in the ligaments. It occurs also in the vagina in which there is chronic hyperaemia. The prevention or early cure of all infective inflammations of the vagina, of endometritis, of erosions and of eversion, is a cardinal point in the prevention of prolapse.

In a similar manner by muscular and vasomotor disturbances in innervation perverted sexual habits (masturbation and onanism) will tend to cause retroversion and descent of the uterus. Here also the appearance of the injurious reaction which follows frequent congestion is dependent upon the state of the general neurotic condition of the individual. Finally, we recognize a purely mechanical displacement of the uterus either upwards or downwards by tumours. The simple downward displacement of a uterus may lead to total prolapse, if at the same time it becomes retroflexed and gravid, and in enlarging has become incarcerated below the promontory. In both cases it should be replaced; either the uterus or the tumour should be pushed upwards and forwards out of the pelvis, and a pessary inserted. If there are peritoneal adhesions which make replacement impossible, then all preventive measures are in vain and radical treatment should be resorted to.

In the last sentences we have already passed over to the preventive treatment of the sequelae of prolapse. Simple descent of the uterus predisposes to miscarriage when the walls are relaxed or the os is everted. It can be prevented by immediate insertion of an oval pessary which should be worn to the fifth month of pregnancy. Plastic operations for the eversion of the os are contra-indicated during pregnancy, because operations on the cervix readily cause miscarriage. But colporrhaphy and perineal operations may be carried out. After such an operation at the sixth month I have observed slight labour pains for a few days, but then all went well. The parts become so readily dilated again that it is better to postpone the operation till after the puerperal period, or till after lactation.

The results of a simple prolapse are apparent in all the organs concerned. They are excoriation and catarrhal

inflammation of the mucous membrane of the vagina, erosion and eversion of the lips of the os uteri, oedema and gradual hypertrophy of the cervix, the formation of pouches in the bladder and rectum with catarrh through stagnation of the urine and faeces, the formation of calculi, circulatory disturbances, as in the formation of haemorrhoids, even gangrene of the prolapsed parts, kinking of the urethra and ureters with secondary hydronephrosis, entero-kolpocele, and peritoneal adhesions of the uterus to the organs in Douglas' pouch which has also descended—and as a consequence sterility. All these troubles, some of them very serious, may be prevented by early radical cure of the prolapse. The commencing formation of adhesions should be met by replacement of the uterus. If firmer adhesions are present, they are stretched or broken down by massage and subsequent plugging of the posterior cul-de-sac. Lastly, a few words about the harmful results of unsuitable treatment of prolapse. Concerning the use of pessaries, I would refer to what has been said above about the action which round thick-brimmed rings exercise in producing eversion when the uterus is relaxed. The lumen of the pessary must be wide enough to allow the vaginal part of the cervix to lie easily within it, otherwise strangulation of the cervix and pressure ulcers will occur. To avoid excoriations and ulcerations of the vaginal mucous membrane the instrument should be removed for a few days every three months, or after the climacteric even oftener. Ulceration may lead to incrustation of the pessary, and to the formation of granulations and even to fistulae. For washing out the vagina it is best to use lukewarm normal saline solution, and this should be done in the recumbent posture, daily if there is leucorrhœa, otherwise once a week or at least several times after every period. As soon as the discharge becomes irritating or foetid, the pessary must be removed and the vagina irrigated with a weak solution of potassium permanganate.

The pessary must not tensely stretch the vaginal walls, and the lower bar must not lie so as to be visible at the vulva ; pain, a sensation of great pressure, incontinence or

retention of urine, and catarrh of the vagina would result.

If the vaginal part of the cervix is too short, it slips out of the pessary and pressure effects readily arise. In such cases a Hodge S-shaped pessary should be used, and the upper bar should be directed backwards, to stretch the parts transversely and obliterate the folds of Douglas' pouch. If scar tissue in the vaginal vault, left by parametritis or by lacerations, or if too short an anterior vaginal wall prevents a correct position of the ring, then pieces of vaginal mucous membrane must be excised by oval incisions, and stitched parallel to the longer diameter of the oval, in such a way that in place of this shortening an increase in length is obtained.

When the ring is imperfectly or not at all retained in consequence of a defective perineum, or of too wide and lax a vagina, a plastic operation should be performed. If operation is refused, or if the patient is old, Schultze's sledge pessary should be introduced, reversed in such a way that the anterior curve looks towards the posterior vaginal vault and the vaginal part of the cervix is carried up by that segment. When the perineum is intact, the vagina very wide, and the prolapse constantly recurs, E. Martin's modification of Zängerle's stemmed pessary, which rests upon the levator ani muscle, is useful. So too is Hewitt's cradle or clamp pessary. The old stemmed pessary on the other hand is very bad, as it causes troublesome ulcers. As a last resource, the oval hollow egg-shaped vulcanite pessaries (generally No. 2 and 3) brought into use again by Breisky, with a T bandage, are to be recommended; these must be removed by forceps when they have to be cleaned.

When hypertrophy of the cervix or tumours are present pessaries must on no account be used.

With regard to hysteropexy in women capable of child-bearing, vaginal fixation or vesical fixation is dangerous, and this is true even if their most recent modifications are used, which are intended to avoid adhesions being formed too high up or too extensively, since their extent can never be determined beforehand. For very serious disturbances have been

observed during pregnancy and childbirth through the failure of the anterior uterine wall to expand, and the consequent overstretching of the posterior wall; and in order to render delivery possible, it has been necessary to make an incision through the whole anterior uterine wall, or even perform a Caesarian section. Similar disturbances in cases of ventrifixation of the fundus uteri have occasionally been reported.

3. THE PREVENTIVE TREATMENT OF INVERSION OF THE UTERUS

This depends intimately upon aetiology. It may be caused by relaxation of the dilated cervix with very strong contractions of the body of the uterus, and the presence of adhesions between the body which is being expelled from the uterus and the fundus, as in fibromyoma or adherent placenta. It may also be due to relaxation of the body of the uterus and forcible expression of the placenta by Crédé's method, or to strong traction on the umbilical cord; or it may occur in precipitate labour.

Fibrous polypi should be removed when they begin to cause dilatation of the os uteri. When a placenta is really adherent it should be removed by the hand, with strict antiseptic precautions. Crédé's expression of the placenta should be made only during a pain; forcible traction should never be made on the umbilical cord. In threatened precipitate labour the patient should be placed in the lateral posture and forbidden to make any bearing down efforts, and a sedative may be given.

Treatment to prevent the results which may follow inversion consists essentially in immediate replacement of the uterus, for the longer we wait the more difficult does it become. The best method is to dilate the vagina and use massage and cold injections, and to administer ergot after replacement. A funnel-shaped piece of peritoneum is carried down by the inverted uterus, and unless the uterus is soon replaced peritoneal adhesions form which later can be overcome only with difficulty, if at all.

It must be borne in mind that an error in diagnosis

between an inverted uterus and a polypus has led to the removal of the uterus in mistake for a polypus.

During replacement counter-pressure should be made on the abdomen to prevent a rupture of the vagina.

4. THE PREVENTIVE TREATMENT IN DISPLACEMENTS, VERSIONS AND FLEXIONS OF THE UTERUS

These three forms, which have been already defined, may occur combined one with another and with change in the position in the level of the uterus, as in prolapse.

(*a*) With regard to displacements of the uterus, aetiology teaches that inflammatory exudations, as in parametritis and perimetritis, cause displacements in a definite direction; first indeed in one direction by the presence of the exudation, and later in the opposite direction by contraction of this newly formed fibrous tissue; and this leads to fixation. The same result may follow appendicitis.

The displaced uterus generally remains movable when the displacement is due to a tumour, whether it be a tumour of the uterus, of a neighbouring organ, or simply an habitually overfilled bladder or rectum, or a hydrosalpinx or pyosalpinx. A congenital inequality of the ligaments of the uterus is unimportant. Among tumours of the pouch of Douglas, extra-uterine gestation is specially important.

The preventive treatment to be adopted is that described under "Inflammations" and under "Tumours." Commencing adhesions should be early removed by massage to prevent an abnormal fixation of the uterus.

During the years of school care should be taken to prevent girls getting into the harmful habit of neglecting to empty the urinary bladder, from mistaken ideas of propriety. So also with regard to habitual constipation, the rule of a fixed hour for the evacuation of the bowels from childhood onwards is the best way of inducing regularity of the bowels, especially in chlorotic girls.

The further development of ectopic gestation may be prevented in the early months by the injection into the tumour of small doses of morphine hydrochloride, or it may be removed.

(*b*) By pathological anteflexions of the uterus we mean those only which are permanent; they are accompanied generally by very slight mobility of the body of the uterus.

We have already spoken of the initial stage in the anteflexed infantile uterus. The diminished mobility may be the result of the position of the uterus in the pelvic cavity, or of the relation of the body to the cervix. When the anteflexion has not been produced by any limitation of movement by fixation, it has been caused by a rigidity of the "flexion angle," as a result of the formation of inflammatory fibrous tissue.

In another variety the cause is to be found external to the uterus, most frequently indeed in the cord-like indurations left by parametritic and perimetritic exudations. These may fasten the body of the uterus to the bladder and anterior pelvic wall in front, or may fix the cervix to the posterior wall behind—the latter being the more frequent. If an adhesion draws back the posterior part of the uterus near the internal os, anteflexion is produced. This may also be produced by fixation of the cervix of the uterus anteriorly, but this is very rare.

Tumours produce anteversion and anteflexion in various ways; as by pressure from above and behind when the tumour is connected with some other organ, as with an ovarian cyst, or by a fibroid in the anterior wall of the uterus which may simulate a flexion; but the diagnosis can be established by passing a uterine sound. Submucous polypi may also cause anteversion. Fibroids in the anterior wall may, according as they are situated in the cervix or in the body of the uterus, produce either anteversion or anteflexion.

Increased weight of the uterus, as in metritis or early pregnancy may cause a bending forward and lowering of the body of the uterus. From what has been said, it is clear that the preventive treatment should aim at the prevention or the early cure of inflammations of the vagina and uterus, and also of the pelvic connective tissue, of the adnexa and of the pelvic peritoneum.

Once the acute inflammatory stage has passed, it becomes

necessary to remove adhesions by massage or later by incisions to set free the adherent organs, or by forcible breaking down of the adhesions and subsequent plugging with glycerine gauze. Compression by firm plugging of the vagina with moistened cotton wool pledgets or with a shot bag and the application of bags of sand or of shot to the abdomen are useful.

By these measures too the various sequelae of anteflexion are prevented, such as dysmenorrhoea, sterility, constipation, tenesmus, and bladder troubles. Whether removal of the tumour is indicated depends upon its nature, and upon the severity of the symptoms produced by the anteflexion.

(*c*) The preventive treatment of retroversion and retroflexion of the uterus depends in most cases upon the removal of the neurotic disposition, the local effect of which has been to lower the muscular and vasomotor tone of the pelvic organs and their ligaments, and thus to produce descent and prolapse. In speaking about the latter we have already enumerated the general and special preventive measures to be taken, as we believe retroversion of the uterus to be the first stage of descent.

Congenital retroversions are very rare; but the predisposition to these may be congenital, and leads to puerile retroversion and retroflexion at puberty, when the body of the uterus becomes heavier relatively to the cervix. With such predisposition, an habitually overfilled urinary bladder, early excessive abdominal straining and the dorsal position in the puerperal period act as exciting causes producing retroversion and later retroflexion of the uterus. The recognition of this predisposition affords the indication for the avoidance of these causes. The puerperium is too the most favourable moment for the prevention or cure of these anomalies in position, seeing that retroversion of the uterus is produced by the same causes which produce prolapse. We employ the same treatment for these as for descent of the uterus. Here too subinvolution of the uterus plays an important part, partly because of the increased strain upon the ligaments, and partly because of the engorgement of blood and the consequent diminution of elasticity of

the ligaments. Regarding the use of pessaries, I must add that the object to be attained is not the complete forward replacement of the uterus, but rather the support of the posterior cul-de-sac and relief of the strain on the ligaments.

The puerperal processes however act also in another way, the most important of all: this is by giving rise to inflammations, either alone or in combination with injuries of the vaginal vault, and stretching, dragging and secondary relaxation of the generative organs. The inflammation itself next weakens the ligaments. The neck of the uterus may be pulled forward by inflammatory indurations, or the body of the uterus may be firmly fixed in Douglas' pouch by perimetritic bands. Apart from these primary inflammatory processes, secondary adhesions may be formed on the posterior surface of the retroverted uterus. These adhesions hold the uterus and thus make the flexion permanent.

Just as the weight of the puerperal or gravid uterus or the enlarged uterus in metritis may induce retroversion, and the adhesion between the uterus and the intestine may hold down a uterus which otherwise would be mobile, so heavy tumours may act in the same way, whether they are situated in the uterus itself or in the adnexa or in neighbouring organs.

The preventive treatment is similar to that for anteflexion of the uterus.

All troubles and morbid conditions which appear first in later life and cause chronic hyperaemia and permanent laxity of the ligaments produce retroversion of the uterus.

To this class belong all chronic disorders of metabolism and dyscrasias, general neuropathic conditions with local disorders in innervation and perverted habits. Cases of simple retroversion also, in which the author has observed spasmodic flexions, belong to this group. Preventive treatment should be directed against these conditions, according to the details already given under "Infantile Condition of the Generative Organs," "Herniæ," and "Prolapse."

Of practical importance is the preventive treatment of the sequelae of retroversion and retroflexion of the uterus, which are essentially of a nervous type. The controversy whether

these are purely reflex or whether they are accidental concomitants of a hysterical nature may perhaps be decided by the fact, that according to what has been afore stated, simple retroversion and retroflexion of the uterus almost always arises from a general neuropathic condition, so that the requisite predisposition for the development of these nervous reflexes is present. That such reflexes exist has been proved as a matter of fact by earlier observations, and also by recent ones by the author which are free from objections. For instance in some cases a cough can be caused, "tussis uterina," by touching the posterior fornix with the sound through a speculum. In the uterus itself, spasmodic phenomena may be noticed by palpation if sufficient patience and care are exercised. Thus a functional retroflexion may arise temporarily from a simple retroversion.

The swelling of the mucous membrane which appears in course of time and finally causes chronic metritis is likewise the result of a vasomotor disorder of innervation. Its symptoms are menorrhagia and dysmenorrhoea; the dysmenorrhoea is produced by spasmodic flexion which has been already mentioned, and but seldom by any actual mechanical stenosis due to the flexion.

It is not possible to look upon sterility as the consequence of an ordinary retroversion and retroflexion of the uterus without any inflammatory complication; and apart from complications the cause may be found in a lowering of the general health combined with a morbid condition of the nervous system.

For all these symptoms general treatment to raise the tone of the body is required. For commencing endometritis and metritis the special treatment given under those headings is needed. The adhesions described as occurring between the uterus and the pouch of Douglas may be prevented by early replacement of the organ, by plugging and by massage, and similar treatment may be employed for the troubles connected with micturition and defaecation.

Special care must be observed in cases of retroflexion which are complicated by pregnancy. Although in most cases spontaneous replacement occurs in the second or third

month, yet when this fails to take place serious and even dangerous symptoms may arise. In neuropathic patients, excessive vomiting may occur, and difficulty of micturition which may lead to gangrene of the bladder wall. These are the results of retroflexion of the incarcerated gravid uterus. The replacement of the uterus in the second or third month and the wearing of a pessary till the fifth month will prevent this.

For other complications and sequelæ reference must be made to what has been said under "Prolapse."

In conclusion I must mention elevation and torsion of the uterus, both of which as a rule are combined with other pathological displacements. They are caused by tumours or inflammatory adhesions or by the distension of some neighbouring organ. Pathological rotation of the uterus, especially that caused by tumours, may bring about very serious circulatory disturbances and necrosis of the uterine wall, or even a tearing of the tissues. Such occurrences should be prevented by a radical operation, or if this is refused by the use of a closely fitting abdominal belt.

III. Disturbances in Nutrition and Inflammations

(a) *The preventive treatment in disorders of nutrition and of circulation.*

Vascular engorgement in consequence of vasomotor disturbances has been frequently mentioned in the foregoing pages, and we found it generally associated with changes in form and in position of the internal generative organs. These changes owe their origin to a similar loss of tone of the elastic elements in the walls of the organs and their ligaments. In its further course such hyperaemia leads on to inflammation, not infective in origin yet the abnormal secretion of mucus is well adapted to serve as a nidus for bacteria; yeast cells and amoebae have also been found.

A definite set of symptoms arises from this source:

pruritus of the vulva, vaginismus and dysmenorrhoea. In more severe cases there may also be tenesmus of the rectum and bladder, and uterine colic.

Preventive measures consist chiefly in general tonic treatment, as already described under "The Infantile Condition," "Herniae" and "Prolapse."

An aetiological factor which is of great and frequent importance, closely connected with neurotic conditions and hysteria, in this group of disorders is the existence of perverted sexual habits, such as masturbation and onanism, and sexual over-stimulation. On the other hand these morbid conditions may be associated with impotence in the male. Pruritus and vaginismus, as well as neuralgia of the posterior vaginal vault, have in many cases been readily proved to have a causal connexion therewith. These two factors constitute a vicious circle. In a girl thus predisposed we must insist upon her performing household duties which shall fully occupy her time, and upon the avoidance of all such things as tend to stimulate the sensual nature and the imagination, such as lectures, balls and the theatre. When nearing maturity such girls should be under the care of a sensible mother, and not in a girls' boarding school, very few indeed of which are in a position to give to each individual girl the special training she requires, and which afford scope for numerous follies that injure both body and mind. An occupation in which mental work preponderates is useless. We must note that masturbation is sometimes seen in quite young children. It is sometimes caused by the irritation of thread worms, and these should be looked for and treated; in other cases it is due to vesical calculi, or to fissures in the region of the clitoris or hymen. These fissures often give rise to vaginismus, analogous to the tenesmus of the anus caused by anal fissures. They are most quickly cured by dabbing with ichthyol.

Pruritis of the vulva is often caused by diabetes.

Vulvitis is caused too by want of cleanliness, especially when leucorrhoea exists or marked enlargement of the labia and clitoris. Cleanliness, bathing with lotions which are antiseptic and astringent, such as lead lotion, powdering

with salicylic acid and talc, or bismuth and talc, will prevent the inflammation becoming worse. When there is a tendency to the formation of boils, the eruption may be checked by the immediate use of Unna's mercurial carbolic plaster upon the tender spots which are just becoming red. Lotions of sodium carbonate may be used for folliculitis.

With regard to vaginismus, we must not forget that it may be hysterical in origin and arise from a fixed dread of connexion. In other cases there is inflammatory hypertrophy of the hymen. A pretended or an actual excision of the hymen and the orifice of the urethra, followed by the passage of a speculum, will convince the patient that the vagina can now be easily entered, and vaginismus will then be less likely to recur. We must remove also all other contributing factors, such as fissures and perverted habits.

The same holds good for neuroses affecting the upper part of the vagina.

Varicose veins are not seldom met with in the broad ligaments and in the nymphae. The latter condition as well as the troublesome sequelae, such as the rupture of the varicose veins and the formation of haematoma of the vulva and thrombosis, may be prevented during pregnancy by compression with a T bandage with a dressing steeped in astringent lotion; and the external genitals should be kept scrupulously clean.

By the bursting of varicose veins of the broad ligament an intraperitoneal haematoma or a haematoma of the broad ligament may arise, and for this reason they should not be neglected. By way of prevention hot mucilaginous vaginal and rectal injections should be given, the regular evacuation of the bowels should be ensured, and compression be applied by plugging, as by a bag of shot in the vagina and also upon the abdomen, and cautious bimanual massage. The patient should afterwards rest for an hour in the recumbent position.

The so-called neuralgia of the ovary has nothing to do with the ovaries, and but seldom with the adjacent nerve plexuses; but is generally neuralgia of the nerves passing

through the recti muscles towards the hypogastrium, or neuralgia of the posterior vaginal vault and of Douglas' pouch and the adjacent part of the rectum. If the pain radiates downwards, it is felt according to my observations in the region of the coccyx and anus; apart from this there is also a true coccygodynia. For all these conditions, preventive treatment consists in the treatment of the general neurasthenia and of the local congestions caused by it. Only very seldom do we find actual periostitis or dislocation in coccygodynia.

The congestive inflammations of the vagina, uterus and ovaries, and the dysmenorrhoea associated with these, have already been dealt with.

(b) *The preventive treatment of inflammations and their sequelae.*

There is, as mentioned above, an inflammation of the generative organs, which is not infective in origin. The exciting cause of infective inflammations is infection with microbes, among which gonococci, staphylococci and streptococci play by far the most important part. Their entry is brought about by sexual connexion or by labour, by operations, by foreign bodies, by injuries, or by transference from other organs as in the case of tuberculosis, and of the bacterium coli. As already stated, the presence of bacteria in the secretions of the uterus and the presence of the yeast fungus must not always be regarded as the cause of the inflammation. These organisms have settled there because the secretions had become pathological, or because the entrance of the vagina and the cervical canal had received injuries and been dilated. The primary cause is to be found in the congestion, hyperaemia and engorgement as often mentioned above, as the result of disorders in innervation and conditions of relaxation of the pelvic and abdominal organs. In accordance with this, these inflammations do not finally disappear until the tone of the general and local innervation has been raised.

And conversely the cause of the congestive hyperaemia and engorgement may originally have been infective inflammations, which were cured when the bacteria had died

out or had lost their virulence and which left behind a diminished contractility of all the elastic tissue elements, including those of the vessels. These infective inflammations may have occurred even in early childhood from scarlatina, measles or gonorrhoea.

It is very important then to avoid the introduction of infective germs into the internal genitalia, because these organisms readily make their way along the mucous membrane of the Fallopian tubes to the pelvic peritoneum, or pass through the uterine wall to the parametrium and spread to the ovary. If they have entered the vagina, they should be removed before they pass the internal os. When the acute infective inflammation has subsided care must be taken that no congestion of the organs and ligamentous apparatus remains or loss of elasticity—and on the other hand that no contractions and adhesions exist to produce permanent displacement of the uterus.

1. GONORRHOEA

is the most frequent cause of infective inflammations of the genitalia. It should be remembered that

(*a*) In recent acute infection the internal os uteri and afterwards the uterine orifices of the Fallopian tubes are able for a long time to resist the further passage of the infection, and hence acute infection vary rarely leads directly to salpingitis or perimetritis.

(*b*) That chronic gonorrhoea is the form in which it appears most often in married life, and is caused by latent gleet in the male; and in spite of or possibly by reason of its very slowly progressive course it at last reaches the serous membrane.

The preventive treatment of gonorrhoea belongs to the section on Venereal Disorders. But so far as gynaecology is concerned, and in order that the patient innocently exposed to this infection may be relieved, the husband must be cured of his gonorrhoea or gleet, and coitus should be avoided till he is cured, and again later after any alcoholic or venereal excess. In other words all over-stimulation reacts upon the cocci concealed in the deep crypts, and this fact is the

more important because it is doubtful whether such cases are ever completely cured. Antigonorrhoeal applications in the form of pastilles, of vaginal suppositories, or as douches or as insufflation are useful if used both before and after coitus, but they are not absolutely certain, and tend to prevent conception. All local treatment at such times acts injuriously upon the nervous system especially in those with a neuropathic predisposition. Cold irrigations should be altogether avoided as they cause metritis, parametritis and oöphoritis by disturbance of the circulation.

When infection has taken place treatment is essential to prevent its extension to the internal os uteri: vaginal douching five times daily with solutions of silver salts and under very slight pressure—such as a 5 per cent. solution of protargol, a 5 to 10 per cent. solution of argonin, a 5 per cent. solution of argentamin in cases where treatment of the deeper structures is required, 5 to 20 per cent. solution of silver nitrate as an astringent for after treatment, a 5 per cent. solution of largin which is a powerful antiseptic to the gonococcus though with very slight action upon the nutritive medium. The vulva must be scrupulously cleansed to prevent reinfection and urethritis, or cystitis, or inflammation of Bartholin's glands.

If cervicitis appears the cervical canal should be dilated after disinfection with protargol, and the uterine cavity treated by cleansing, douching, plugging, and the use of pencils or ointments (from ½ to 10 per cent. of protargol), while the patient remains at absolute rest in bed. Finally, treatment should be continued for several weeks longer with potassium permanganate, and lastly with astringents to remove the oedematous condition which is left behind: a 2 to 5 per cent. solution of aluminium acetate or a 2 to 3 per cent. of bismuth subnitrate may be employed.

If for other reasons this thorough treatment cannot be carried out vaginal douches should be ordered; they may consist of a 5 per cent. solution of protargol, or 5 to 20 per cent. solution of silver nitrate or potassium permanganate, or a 1 in 2,000 or 4,000 solution of corrosive sublimate. The vagina should be wiped out and plugged several times

a week with a 10 per cent. protargol gauze, or the patient should herself apply 10 per cent. protargol glycerine plugs. The cervix should not be treated.

With a pyosalpinx, bilateral as a rule in cases of gonorrhoea, extension to the peritoneum must be prevented. Simple salpingitis can be cured by sedative treatment, mercury and rest in bed, before a pyosalpinx forms. An operation for removal of the tube is indicated when suppuration threatens. Even after recovery from the perimetritis the danger of subsequent attacks is great, and for this reason the parts should be removed; they have already become useless. Otherwise the only preventive treatment possible is to lead a very regular life, and avoid colds and cold feet. For attacks of pain however slight apply an ice bag or at least cold compresses, and the patient must rest in bed. By preventing the inflammation of the uterus from becoming chronic we prevent also the joint affections which may gradually and insidiously through the circulation affect all the joints.

2. ACUTE SEPSIS

is prevented by strict asepsis and antisepsis at operations. When an abscess is to be opened in or near the abdominal cavity, the suppurative focus should be carefully isolated by gauze pads before the incision into the abscess is made. Should the pus nevertheless escape into the abdominal cavity it should be carefully mopped out and the peritoneum drained with iodoform gauze or itrol gauze brought out through the vagina or the lower angle of the abdominal wound. The germs contained in old cases of salpingitis have but slight virulence or are dead. Infected wounds should be disinfected as thoroughly as possible and should be daily dressed with iodoform or itrol gauze. Immediate treatment is the surest way of preventing the extension of the sepsis to the parametrium, the peritoneum or to the lymph or blood stream.

The prevention of puerperal sepsis is dealt with under the hygiene of parturition, to which the reader is referred.

3. ACUTE INFLAMMATIONS OF THE GENITALIA

These are vulvitis, colpitis, endometritis, parametritis and perimetritis, and oöphoritis. They are mostly of gonorrhoeal or of septic origin: besides streptococci, we find staphylococci, bacterium coli and pneumococci as the exciting cause. Cases of colpitis and of endometritis of this nature are occasionally caused by wearing a pessary for too long a time, or by the use of dirty or rough pessaries, by curetting or use of the uterine sound without previously sterilizing the instruments, and even by rough exploration with infected fingers. From what has been said it is obvious that the preventive treatment consists in strict asepsis and antisepsis. And further these inflammations may appear as complications in general acute infections diseases, as scarlatina, measles, smallpox, typhoid fever, cholera, and influenza, and in these preventive treatment should aim at removing the congestion which has been left by the acute disease.

Finally in colds accompanied by suppression of the menses we may meet, not only with acute cystitis and metritis, but also with parametritis and oöphoritis. Immediate confinement to bed, the production of diaphoresis, cold abdominal compresses or an ice bag, local blood letting, mild purgation, and hot vaginal douches are indicated for this as well as for all other acute inflammations of the genitalia.

Acute vulvitis often originates in slight injuries and fissures which have not been kept clean. Cauterization and subsequent treatment with aluminium acetate will prevent the formation of ulcers and abscesses.

4. CERVICAL CATARRH AND ITS SEQUELAE, EVERSION AND EROSION

Preventive treatment consists in the removal of circulatory disturbances and of displacements, and the removal of scar tissue from the os uteri (laceration scars). The scar tissue should be excised and the raw surfaces united by catgut sutures.

Erosions, especially old erosions of papilloid form, have sometimes been observed to undergo cancerous degeneration. To avoid this danger it is wise to remove the diseased mucous membrane by excision according to Schroeder's method, by which the cervical wall including that of the vaginal portion of the cervix is reduced to one half its thickness. Catgut sutures are then passed from the internal os to the external os, and after turning over the flaps are tied so that the line of the former external os is now applied to the internal os.

For the treatment of eversion produced by unsuitable pessaries when the walls of the cervix are relaxed and there are no lacerations of the os see under "Prolapse."

5. PREVENTIVE TREATMENT IN CHRONIC ENDOMETRITIS AND METRITIS OF THE BODY OF THE UTERUS

The longer these chronic catarrhal inflammations have existed, with over secretion of mucus and pus, the more readily do they bring about structural changes in the endometrium and in the uterine wall. The sooner the treatment is commenced, the more easily and the more completely will the affected parts be restored to their normal condition.

Endometritis should not be regarded with indifference, and to look upon every discharge as a condition which presumably need not be treated or is quite irrelevant is indifference which cannot be justified; it causes an unnecessary loss of secretion, of blood and of the patient's strength, and predisposes to puerperal fever, and later affords a favourable site for carcinoma and a number of other morbid conditions.

Chronic metritis may follow every acute form of metritis and also puerperal infective processes. Very often it is the immediate result of a simple non-infective condition of congestion and of relaxation, and for this reason is always met with in retroversion and descent of the uterus. Hence too it is the sequela of all processes which cause frequent congestion such as masturbation, excessive sexual intercourse, cold and irritating vaginal douches, suppression

of the menses and colds. Subinvolution of the uterus also is likely to give rise to metritis, especially when the subinvolution occurs after miscarriage, or after failure to suckle the infant though there is sufficient milk in the breasts; these occasional determining causes bring about the result probably because a neuropathic predisposition already exists.

Upon the soil thus provided by chronic endometritis, erosions and eversions may develop, and solitary or multiple adenomatous new growths (polypi) may form. Preventive treatment should concern itself with the avoidance or speedy removal of all infection on the one hand, and on the other hand with the removal of general and local disturbances in innervation as has already been stated.

And further we must see that simple catarrhal endometritis does not become haemorrhagic or purulent, and so lay the foundation for structural changes and for adenomatous growths.

A free outlet for the secretion must be provided, and may necessitate a dilating of the cervical canal; the vagina should be washed out several times a day with lukewarm or hot normal saline solution, the patient being in the recumbent posture. Astringents and antiseptics are generally added without much discrimination. Astringents are suitable for erosion and eversion, though cauterization through the speculum is more effectual, and for vaginitis. Antiseptics are best for infective or septic inflammations—but long continued applications and strong irritating antiseptics should be avoided. Hot douches excite contraction of the uterus and thus tend to expel the secretion. This may be assisted by the administration of ergot; or by the use of stypticin and hydrastis immediately before the commencement of the period we may act upon the vasomotor system in menorrhagia. During the first stage of metritis, that of hyperaemia, cotton wool pledgets soaked in glycerine and placed in the vagina produce depletion and stimulate the uterus to contract, and this may be combined with compression by means of bags of shot in the vagina and on the abdomen.

During the menstrual period there is diminished power of resistance against injurious processes, and these must therefore be especially avoided at this time. Among them must be mentioned colds and cold feet, errors in diet, constipation, habitual overfilling of the bladder, long journeys by rail or by coach, river bathing, balls, heavy lifting, overexertion, sexual stimulation. In those who are thus predisposed, proper precautions should be taken after miscarriage and during the puerperium: two weeks' rest in bed, then the administration of ergot, the use of cold water compresses and abdominal massage, and if possible the child should be suckled; hot vaginal injections and the insertion of a pessary in the second week are also of value. These measures prevent dysmenorrhoea; they are aided by timely scarification of the vaginal cervix and removal of two or three tablespoonfuls of blood, or by wedge shaped excisions from the vaginal cervix. If the process has already become chronic then after dilatation a change of conditions is brought about by cauterizing once or twice a week with a sound wrapped round with cotton wool dipped in a five per cent. solution of zinc chloride. Stronger and more frequent cauterization is contra indicated by reason of the possibility of the formation of scar tissue and adhesions.

But the infective agent must also be combated, in suitable cases, by iodoform, or by silver salts in the form of pencils or ointments. Abel recommends plugging the uterus with iodoform gauze. For the purpose of "biological displacement" Landau introduced yeast cultures. The plug at the same time stimulates contraction.

When once swelling of the mucous membrane is present, the possibility of further development may be prevented by curetting, after dilatation of the cervix and the subsequent application of liquor ferri perchloridi or tinctura iodi twice daily by means of a sound after the uterus has been washed out, or steam may be applied at a temperature of 220° F. for not more than a quarter to half a minute. The author has found the latter process very useful in obstinate cases with metritis, but it must never be used while the patient is allowed to go about, and in some patients it

must be performed under an anaesthetic and always after dilatation and measurement of the uterus to avoid perforation of the uterine wall. The organ contracts vigorously under the action of the steam, and in order to avoid local effects by the heated metal the apparatus should be slowly rotated and moved about. The method must not be used by any one who is not skilled in gynaecology. My own experience is that it not only checks haemorrhage and suppuration, purposes for which it was introduced, but that it acts as an alterative unlike any other treatment.

6. PREVENTIVE TREATMENT IN CHRONIC PARAMETRITIS

In cases which have developed out of an acute parametritis and which are characterized by contraction of the residual products and the formation of scar tissue, or by slowness in the absorption of the exudation products, associated with small abscesses which cannot properly discharge their contents, we must endeavour as soon as the fever and pain have ceased, to remove the residual products of the parametritis, in order that no firm fibrous bands may arise, for these are difficult to treat and lead to displacement, flexions and strain upon the pelvic organs. Treatment should consist of massage, aided by hot vaginal douches and by plugging, which is best performed by a dilatable indiarubber bag.

The long delay in the absorption of exudations and the loss of strength produced by the suppuration must be met by measures which tend to promote absorption, such as the introduction of tampons with glycerine, iodine and potassium iodide, combined with compression by means of bags of shot placed in the vagina and on the abdomen, and hot vaginal and rectal injections at a temperature of 90° F. to 100° F.; a few litres may be administered several times daily the patient being recumbent. Massage may be used but with caution, and hot sand baths and saline baths may be given, and the patient should have a nutritious diet. Should pyrexia occur the treatment must be discontinued and cold water compresses must be applied to the abdomen.

Intra-uterine treatment must never be used. Care should be taken that the bowels are freely open.

There is too an atrophic form of parametritis, which is produced by over stimulation of the genital nerves and long-continued loss by over secretion; this is due to frequent pregnancies with lactation in the intervals, and to sexual excesses. It consists of a fibrosis of the connective tissues following upon a periphlebitis which starts in the ligaments and ultimately involves the whole genital tract. Preventive treatment should be directed against these injurious causes, especially against masturbation. The further progress of the fibrosis may be prevented by hot vaginal douches, the use of the vaginal thermophore, and hip baths, massage, intra-uterine stimulation by tents, the use of intra-uterine tampons and irrigation with a solution of sodium carbonate.

Apart from infection we find a traumatic non-infective contraction of the parametrium after laceration occurring during labour or after injuries caused by a sudden fall or by heavy lifting. The injury often does not obviously involve the vagina. But if such contractions are diagnosed it is well to stretch them early, or to excise the scars and stitch the parts in such a way that the contracted part in the vaginal vault may be widened.

7. PREVENTIVE TREATMENT IN CHRONIC OÖPHORITIS

The chronic form which is derived from the acute form of oöphoritis, whether gonorrhoeal or septic, arises through infection by the lymphatics, or more frequently by the direct extension of a salpingitis. This condition is inseparable from perimetritis involving the tube and ovary and will be considered subsequently.

It is otherwise with fibrosis of the ovary, which finally leads to complete destruction of all the follicles by the formation of fibrous tissue. Preventive treatment consists in the avoidance of all that would lead to congestion; there should be sexual abstinence, a discontinuance of pernicious habits and over stimulation; the bowels must be regularly evacuated, hot vaginal and rectal injections, or hot and cold

vaginal douches at temperatures of 60° F. and 90° F. alternately, treatment by compression, and at night a cold water compress may be employed.

8. PREVENTIVE TREATMENT IN CHRONIC PERIMETRITIS WITH SALPINGITIS AND OÖPHORITIS, AND PELVIC PERITONITIS.

Prophylaxis consists on the one hand in treatment of the corresponding acute inflammation or of the primary focus, whether a metritis, a parametritis, an oöphoritis, or a salpingitis, generally septic or gonorrhoeal in origin, and on the other hand in checking the further extension of the primary focus of infection.

This is best effected by active measures: such as an ice bag, a cold water compress, and the local abstraction of blood. Lukewarm mucilaginous or saline irrigation of the vagina under slight pressure should be employed, together with the application of substances which are antiseptic and tend to cause absorption by the blood and lymph channels. Care should be taken that the skin, kidneys and bowels act freely in order to get rid of the toxine. A nourishing diet is important, and later on stimulation of the heart by alcohol and by friction.

When the acute stage is over, the slow transition into a chronic stage must be prevented by energetic treatment to promote absorption, such as mud baths, hot sand baths, saline baths, vaginal and abdominal compression, vaginal thermophore and tampons, with glycerine, iodine and potassium iodide, hot vaginal douches, and a nourishing diet. Later, massage may be used, partly to hasten absorption, partly to prevent displacement and fixation of the uterus and ovaries.

If a localized pelvic peritonitis has been formed by the adhesion of a coil of intestine across the pouch of Douglas, rest is needed to prevent a general peritonitis. The intestine is placed at rest by tinctura opii, or if there is profuse diarrhoea by extract of opium with bismuth subnitrate. In this condition any interference with the internal genitalia is contra-indicated.

Gonorrhoeal pelvic peritonitis is apt to recur, and therefore to prevent these recurrent attacks of fever which confine the patient to bed for weeks at a time, it may be advisable to perform a vaginal or suprapubic hysterectomy.

When encapsuled intraperitoneal abscesses form, it is most important to provide a safe and free outlet for the pus. Perforation of the rectum brings with it the risk of decomposition, a passage for the pus should therefore be made through the vagina. Should it open into the bladder an ascending pyelonephritis may be set up, and to prevent this it may be necessary to make a temporary vesical fistula by a suprapubic cystotomy or by an incision through the vaginal wall.

9. PREVENTIVE TREATMENT IN TUBERCULOSIS OF THE GENITALIA

The agent is the tubercle bacillus, and its entry is favoured by a general predisposition. There seems however to be also a local predisposition to it after gonorrhoeal or septic infection or mixed infection, and also when fissures appear in the epithelium of the vagina or vulva. Such fissures make it easy for primary tuberculosis of the genitals to be produced by coitus, or by examination with an infected finger, or by infected linen and similar occasional exciting causes.

Secondary tuberculosis is more frequent, and arises through the circulation, as from tuberculous disease of the intestines, lungs or kidneys. Infection may pass to the generative organs by the lymph path, or by infection of a Fallopian tube from the peritoneum, which is the most frequent of all. It may be caused by contact with a tuberculous intestine.

Preventive treatment consists in part in the prevention of the occasional causes mentioned above and in part in the early removal of inflammations occurring in other regions. It is essential to raise the general tone of the body. In primary tuberculous disease of the genitalia removal of the

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tuberculous focus is indicated as a prophylactic measure to avoid a general infection of the body. This holds good also for solitary ulcers of the vulva or bladder. If the ulcer is vesical excision is carried out by the suprapubic operation, and iodoform gauze tampons are used. Some writers have recently recommended tuberculin R for these cases. In tuberculosis of the peritoneum opening the abdomen often suffices to check the progress of the disease, and according to Löhlein opening the peritoneum through the vagina answers the same purpose.

10. PREVENTIVE TREATMENT IN CYSTITIS REGARDED FROM THE STANDPOINT OF GYNAECOLOGY.

Vesical catarrh may be caused, not only by the introduction of infectious germs into the bladder, but also by injuries and by disturbances of the circulation; both these causes must therefore be borne in mind. The most frequent exciting cause is catheterization, by which slight injuries may be inflicted at the neck of the bladder, as may also be caused by calculi and other foreign bodies. The most frequent predisposing cause is cold, which produces a disturbance of the circulation. Pathogenic germs are at all times present in the urethra, and bacteria, especially the bacterium coli, get into the bladder in spite of the most careful sterilization of the catheter and cleansing of the urethra. The difficulty of micturition which necessitated the use of the catheter arises often from some cause such as paresis or bruising, which induced at the same time disturbances of the circulation, so that it is not even necessary that the catheter should first produce some fissure or abrasion in order that decomposition of the urine may occur upon the soil produced by a congested vesical mucous membrane. These primary circulatory disturbances of the bladder wall must be removed by wet compresses, hot spirit fomentations on the abdomen, hot compresses over the symphysis and urethra, wet compresses around the lower limbs or of the whole body. We do not recommend any active treatment with antiseptics, because the frequent passage of the catheter is apt to

produce excoriation of the urethral mucous membrane, and thus provide a suitable nidus for germs.

Alterations in the bladder wall may arise too from inflammatory processes in the connective tissue, such as parametritis and perimetritis, which lead to exudation and to suppuration. Silk ligatures and elastic ligatures which have wandered into the bladder and tumours may also cause disease of the bladder wall. It can be seen by the cystoscope that each perforation is preceded by hyperaemia and local swelling of the wall.

Secondary vesical catarrh is readily produced when bacteria have been present in the urine for any length of time, whether as the result of kidney disease, such as tuberculosis, or of general sepsis. Washing out with boracic acid lotion and the administration of salol are the most effective preventive measures.

Pathogenic germs found in the healthy urethra are generally of a very low degree of virulence. But it is otherwise when infective vaginitis is present and its secretion flows round the urethral orifice. Vaginal irrigation with antiseptics is here suitable.

The severer cases of cystitis which have been neglected lead to dangerous disorders and changes in the bladder, and prophylactic treatment of these sequelae is important. Among the sequelae are chronic vesical spasm and paresis, producing incontinence or retention of urine according to the muscle which is affected. After long existent cystitis the wall may become hypertrophied and the cavity reduced in size. The latter may be prevented by the injection of fluid into the bladder in daily increasing quantity. In retention complete loss of power of the muscle may be prevented by massage, cool compresses and douches, by catheterization and by electricity. To carry out the application of electricity the bladder is filled with water, one pole well insulated is passed into the bladder, the other pole is placed upon the symphysis or in the lumbar region or on the perineum, and the induced current employed. To avoid paresis of the sphincter, which produces incontinence, the exercise of the will with tonic treatment and

hydrotherapeutic measures plays the chief part. The presence of calculi, foreign bodies and sacculation of the bladder must previously be excluded.

IV. The Prevention of Injuries and their Sequelae

(a) Lesions and changes produced by scar tissue.

Lesions of the generative organs are caused mostly by parturition. The effects vary with the situation. Healing by scar tissue at the vulva seldom causes atresia; on the contrary gaping is more commonly produced. The same result is seen at the os uteri; lacerations heal by scar tissue and eversion is produced. However in the vagina, the vaginal vault and the cervix we meet more frequently with stenosis and atresia.

How lacerations of the perineum may be prevented will be later described under "Obstetrics"; their sequelae have already been treated of under "Prolapse" and under "Inflammations of the Mucous Membranes."

Two other kinds of lesions of the vulva are known: traumatic lesions and lesions arising during coitus. Severe traumatic lesions, especially those near the clitoris, may cause serious loss of blood which may prove fatal in pregnancy, and the bleeding points should therefore be ligatured. A tough hymen should be incised by a crucial incision, and in vaginismus the entrance of the vagina should be forcibly stretched under an anaesthetic, or dilated by the passage of specula. All other troubles resulting from perineal lacerations, such as urethritis by descent of the unsupported anterior vaginal wall, incontinence of faeces in complete lacerations of the perineum, intertrigo, "garrulitas vulvae," that is the audible exit of air which has made its way into a gaping vagina, pruritus and the formation of rhagades at the base of the scar—all may be prevented from becoming chronic by an excision of the scar and by bringing together the freshened surfaces by sutures.

Ruptures of the vagina are the result of violence: in

coitus, or according to the author's observations in vaginismus with cramp of the muscles of the fornix, want of skill in performing operations, the introduction of the hand or of pessaries and specula which are too large, and attempts to procure abortion.

To arrest bleeding the bleeding points should be ligatured or be compressed with iodoform gauze, the parts having first been thoroughly disinfected and all necrosed shreds removed.

Lacerations of the cervix produce eversion; their treatment has already been given, together with that of their sequelae, under the heading of "Cervical Catarrh." To prevent the formation of fissure ulcers and parametritis vaginal douches with antiseptics are needed.

Annular and extensive injuries (in parturition or by cauterizing or by ulceration) cause traumatic stenosis and atresia of the vulva, vagina, or uterus. Preventive treatment consists partly in suitable obstetric aid, partly in maintaining absolute cleanliness of the wounds and thereby hastening their healing. If nevertheless contractions set in they should be overcome by stretching with plugs, or if there has been much loss of mucous membrane by a suitable plastic operation after excision of the scar tissue.

If complete atresia is present very serious results may follow when pregnancy exists or when the retained menstrual fluid produces haematometra and haematosalpinx. In acquired atresia the menstrual fluid, unlike that in congenital atresia, readily undergoes decomposition. If unfortunately the haematosalpinx is burst by reflex contraction while the incision is being made for the relief of the atresia of the vagina or uterus severe peritonitis is the immediate result. The menstrual fluid should therefore be very slowly drained off, and afterwards a large incision should be made and plugged with iodoform gauze.

(*b*) *The prevention of fistulae.*

Fistulae arise most often as the result of injuries during childbirth; they may appear at once as tears through the tissues or they may appear a few days after delivery,

having been formed by the sloughing of a portion of tissue which had been subjected to too great pressure by the foetal head or injured by pressure with the forceps. Their preventive treatment will be given under "Obstetrics." Such conditions arise in a generally contracted pelvis with impaction of the head with brow and face presentations. It should be remembered that vesico-vaginal and even uretero-cervical fistulae produced in parturition tend to become spontaneously cured by the drawing together of the parts during involution and by the formation of granulations. The introduction of a self retaining catheter will assist this natural process.

Fistulae may be produced by pessaries, especially by Zwanck's winged pessary, and this was referred to in detail under "Prolapse." They may also be caused by operations, by foreign bodies and other injuries, or by ulcerative processes which produce perforation, as seen in malignant growths, diphtheritic puerperal and venereal ulcers, vesical calculi, perimetritic and parametritic abscesses, haematocele, or extra-uterine gestation.

To prevent the formation of fistulae during operations ligatures should not be too close together, and not too tense when there is a narrow septum between two hollow organs, otherwise necrosis is apt to occur. Spaces should not be allowed to remain in the connective tissue in which fluid can accumulate and pus be formed producing abscesses which afterwards break. Adjacent cavities must not be opened by mistake and diverticula or tubes, such as the ureters, must not by oversight be caught in the ligatures.

Large bleeding vessels must not be allowed to remain unligatured and so produce haematomata. Foreign bodies are generally put into the vagina for the purpose of procuring criminal abortion or for masturbation. Their removal often presents great difficulty, especially as such bodies as hairpins are found even in the bladder. If a parametritic or perimetritic abscess or an ectopic gestation threatens to open into the vagina or into the rectum or bladder, a free outlet for it must be made into the vagina, otherwise decomposition is apt to occur and

the fistulae produced by the perforation are more difficult to heal.

When inoperable tumours reach the wall of the bladder or of the rectum they should no longer be treated by curetting but only by the benzene cautery or by hot steam, or a fifty per cent. solution of zinc chloride may be applied to stop decomposition and pain, and to leave a firm fibrous layer. By the so-called prophylactic total extirpation in cases of inoperable cancer these serious complications are avoided.

(*c*) *The prevention of traumatic haemorrhage.*

Traumatic haemorrhage into the connective tissue around the genitalia produces haematomata; if into the abdominal cavity it produces intraperitoneal haematocele. Haematoma vulvae is formed almost exclusively by the bursting of a varicose vein during parturition and occasionally by direct violence. The author saw one such case which reached half way up the vagina and afterwards suppurated.

Compression by bandages with lead lotion, frequent assumption of the recumbent posture and regular evacuation of the bowels will reduce the varicose veins. If a vein bursts a firm pad should be at once put on and secured by a T bandage and an ice bag applied. The treatment for a suppurating haematoma is important. If the skin is whole or there is only an excoriation or a fissure applications of aluminium acetate may suffice. Even if the skin threaten to necrose but there is no fever an attempt may still be made with this application; but as soon as fever sets in an incision must be made and the cavity firmly packed with iodoform gauze. If the haematoma of the vulva increases in size in spite of compression and use of the ice bag, the physician must not leave the patient, because pressure may cause the skin to give way and the patient may quickly bleed to death. This risk is prevented by immediate incision and ligature of the vessel, and the danger of suppuration so common in large haematomata is also removed.

Haematomata behind, by the side of, or in front of the uterus are most often caused by a fall. Slight lesions of

the uterine ligaments produced by stretching we have noticed in delicate women after heavy lifting or falling backwards, and these are similar to the haemorrhages occurring in lesions of the abdominal muscles. Preventive treatment of the sequelae should be directed first to the prevention of further haemorrhage and next to the removal of the relaxation of the ligamentous apparatus and descent and retroversion of the uterus which have been left by the acute overstrain. In every case the patient should remain in bed, and firm plugging is needed together with a sand bag on the abdomen, and later a pessary may be needed. Colds and heavy work should be avoided at the menstrual periods, otherwise relapse is very likely to occur.

When the haematoma tends to become inflamed, an ice bag upon the abdomen combined with compression through the vagina is useful. If the haematoma continues to increase in size and there is danger of its bursting into the abdominal cavity, it may become necessary to lay it open.

Retro-uterine intraperitoneal haematocele most often arises from the bursting of a tubal gestation or from a tubal abortion. Rarer causes are a haematosalpinx, a parovarian varicocele which has burst, haemorrhage from a Graafian follicle, perimetritis, and rupture of an abdominal viscus or of a haematoma of the broad ligament.

These haemorrhages, especially that caused by ectopic gestation, may prove rapidly fatal, and it is important therefore to remove any of the above mentioned causes directly they have been diagnosed.

One of two procedures is possible in the case of tubal gestation:—1. During the first three months one or two attempts may be made to destroy the foetus by injecting about a third of a grain of morphine hydrochloride into the sac. 2. The ovum may be removed by abdominal section or per vaginam if the sac is small and pedunculated.

When the sac is not pedunculated it is best to wait till the foetus is dead, otherwise haemorrhage is apt to be abundant—six months is the most favourable time.

If haemorrhage has already occurred the abdomen should

not be opened unless, from the increasing anaemia or recurring collapse, it is evident that haemorrhage has not ceased. But every available means should be taken to prevent this: by ice bag and sand bags on the abdomen, rest in bed with the head and body low and the pelvis raised to procure absorption of the intraperitoneal blood, opiates, saline solution hypodermically and per rectum. Stimulants should be given with caution. Later, when the clot begins to suppurate an incision should be made through the vaginal wall, and plugs of itrol gauze or iodoform gauze applied in order to prevent the formation of chronic abscesses which might eventually break through into the abdominal cavity.

If the sac is firmly adherent with abundant vascular adhesions, as in abdominal gestation, the sac may be partially or entirely left, provided that precautions have been taken to prevent peritonitis by packing with strips of gauze, the ends of which should be brought out at the lower angle of the wound for drainage, or by an extraperitoneal suturing of the sac to the edges of the wound. As a precautionary measure the ovarian vessels and anastomoses with the uterine vessels should be temporarily clamped. If it is decided to empty a haematocele because it threatens to break through into the rectum, leading to decomposition of the clot, it is advisable to remove the mass together with its fibrin capsule as one would a tumour.

When haematosalpinx exists there is the constant danger of its bursting : it is advisable to remove it by an abdominal section, especially when there is a uterus bicornis with an imperforate cornu ; because when the tube is tensely filled a careful examination or an incision into the haematometra from the vagina may cause the haematosalpinx to burst. The danger is less when the atresia is lower down. When a vaginal operation is performed care should be taken to let the blood escape slowly, and afterwards to remove a large piece of the septum to prevent a recurrence of the atresia. In these cases and in all cases of haematocele no intra-uterine manipulations such as the use of the sound or curette are permissible.

To prevent the formation of indurations after absorption, use is made of mud baths, saline baths, hot vaginal douches, compression by plugging and by a weight upon the abdomen, and pledgets of iodine, potassium iodide and glycerine. During subsequent menstrual periods the patient should remain in bed, as haemorrhage is apt to recur at these times.

The preventive treatment of the other causes of intra-peritoneal haemorrhage has already been described.

(*d*) *Preventive treatment of foreign bodies in the genito-urinary organs.*

Foreign bodies in these organs may cause injuries by their passage into the organ, or may later cause inflammatory changes by their presence. Preventive treatment for the first group of injuries has been given under "Lacerations of the Vulva, Vagina, or Cervix."

Foreign bodies may reach the bladder or vagina in four different ways:

1. Pieces of surgical instruments may be left behind, such as pieces of vaginal tubes or glass specula, incrusted pessaries, needles, tampons—which by their foetor may be mistaken by an unobservant physician for a carcinoma—gauze pledgets, laminaria, forgotten silk sutures, and an incrusted catheter.

2. Through masturbation or criminal acts: bodies such as hairpins, tapers, pencils and cotton reels; tampons, sponges and pessaries used to prevent conception; knitting needles and other pointed instruments used to procure abortion.

3. By falls upon a pointed stake.

4. Derived from the body itself; as from perforating tumours, dermoid cysts giving rise to teeth and hair; the bones of a macerated or decomposed foetus from an extra-uterine gestation; echinococcus vesicles; bodies coming through fistulae from other hollow organs. To this class belong vesical calculi and retained products of conception, as in missed abortion or missed labour.

These foreign bodies may lead to inflammation, ulceration or the formation of fistulæ.

For the prophylaxis of group 1 a few practical hints

may be given. Some opaque glass specula of a cheap kind, with thin walls of a greyish colour, break very easily and in many there are chips and rough places. The glass bivalve specula are dangerous. As to pessaries, all that is necessary has already been said in the chapter on "Prolapse." The vaginal mucous membrane is particularly prone to become excoriated after the menopause. Tampons should be made with a firmly knotted strong piece of silk, or a band long enough to hang from the vulva; the silk is tied either round the centre of a cylindrical pledget made of cotton wool which can be passed into the vagina crosswise, or in the pedicled mushroom form used for applying medicaments; the silk is made fast inside the ball of the tampon, the outer layer of the ball is twisted round the stalk and the projecting piece of silk is then tied to the stalk. Laminaria and tupelo tents should be inserted so that one end of the tent projects beyond the os uteri, otherwise they may become fixed within the os and an incision may then be needed to remove them. It is still better to cover the tent with a piece of gauze and let this hang down from the os. A similar gauze sac passed through a speculum and filled with pledgets of cotton wool is very useful as a plug to produce compression; the gauze bag with its contents can then be pulled out and nothing can be left behind by oversight. Deep silk sutures have an unpleasant way of wandering even after months or years into some hollow organ (see "Cystitis"). Except for the main vessels (uterine vessels), all ligatures used for mucous membranes and for internal organs should be made of well prepared cymol catgut. For the skin, nonabsorbent ligatures should be used: silver wire, silkworm gut, celluloid thread, or caoutchouc silk. Glass and rubber catheters should be examined directly before and after use to see that they are perfect.

In extracting foreign bodies certain precautions must be taken to avoid causing injuries elsewhere, which may be very difficult to heal. Generally there is some inflammation and some decomposition; the genitalia are swollen and the foreign bodies of such a shape as to be difficult to extract:

such as hairpins with their divergent pointed ends towards the vulva. Before the foreign body is removed, injections, with disinfectants (lysol is the best for this purpose), should be used. Long foreign bodies should be seized by one end and thus extracted. In some cases it is best to make more room by incisions, and so prevent the risk of lacerations and contusions which might afterwards become infected. Deep anaesthesia is needed to produce insensibility and relaxation of the muscles, especially of the constrictor vaginae.

In removing foreign bodies and large calculi from the bladder a cystoscope should be used, the urethra should be dilated sufficiently to admit the little finger and a pair of dressing forceps, the bladder being filled with boracic acid lotion. If the foreign body cannot be reduced in size it becomes necessary to make an opening into the bladder from the vagina, or to perform a suprapubic cystotomy. Vesical calculi are seldom found in women, because of the shortness and width of the urethra, which permit concretions as large as a cherry stone to pass. All foreign bodies, including the mucus and pus of vesical catarrh and of vesical diverticula, become encased by deposits of urates, phosphates and oxalates or of cystin, and therefore all causes which lead to catarrh of the bladder and to retention of urine should be speedily removed.

V. The Prophylaxis of New Growths

From the aetiology of tumours, which is still largely only speculative, we gather for purposes of preventive treatment that among the causes which predispose to the formation of tumours, both benign and malignant, are long continued inflammatory processes of all kinds, chronic infective diseases, wounds which have healed by granulation tissue and subsequent formation of scars at places where two kinds of epithelium meet, chronic congestion, certain tumours primarily benign, and the retained products of conception. We also believe that further causes are to be found in the vulnerability of the genitalia

after excessive cauterization, and at the menopause when there is at the same time some general predisposition.

Finally, mention must be made of congenital sarcoma and of dermoids, the cause of the origin of which is still obscure.

Whether malignant epithelioma is an amoeba infection is still a contended point. It should be remembered too that Ribbert and Weigert and recently Lubarsch think that the cause of the increased growth lies not in any increased activity of the epithelium but rather in a diminished resistance of the surrounding connective tissue, that is a failure to resist the growth of the epithelium.

Tumours may also produce secondary growths in structures which have vasomotor connexions with them or which are supplied by the same vessels. So endometritis fungosa is associated with ovarian cysts and with intramural fibromyomata. Of special interest is the occurrence of cancerous growths in the pedicle of the uterus after supravaginal amputation for myoma of the uterus.

(a) *Benign Tumours.*

The formation of mucous polypi should be prevented by early treatment of the primary endometritis by curetting or by atmocausis. Removal of polypi with the whole of the pedicle is indicated to prevent general anaemia.

Prophylactic treatment is powerless to prevent the formation of myoma, but can be applied to prevent increase in size of the tumour; for the prolonged use of ergot and the ligature of the uterine vessels will check the growth. The same measures will arrest those cases of menorrhagia which last beyond the climacteric and weaken the body, often to so great a degree that it is not possible to perform a radical operation. Further measures which can be adopted to check these haemorrhages are hydrastis, stypticin, hot vaginal douches (117° F.) hot fomentations, aseptic plugging of the vagina, and finally intra-uterine tampons with ferripyrin or injections of solutions of gelatine.

Vaginal fibromyomata may cause serious difficulties during childbirth, and should therefore be enucleated. Pigmental naevi of the vulva tend to undergo malignant

degenerative processes, and should be removed. The same holds good for vesical papilloma, though histologically benign, quite apart from the fact that they tend also to produce haematuria, obstruction of the urethra by clots, and vesical catarrh and calculi. Among benign tumours of the uterine adnexa, parovarian cysts which are large enough to reach up to the pelvic brim should be punctured, because they are apt to give rise to trouble. After puncture they generally remain shrunken. Puncture of ovarian cysts is useless; but the cyst may be reduced in size, if unilocular, by vaginal pessaries of potassium iodide till symptoms of iodism develop, and by painting with iodine and the application of cold water compresses to the abdomen.

(b) *Tumours innocent histologically, which under certain conditions may become a source of danger.*

To this group the vesical papilloma above mentioned really belongs. Further, we may include in this class certain large fibromyomata of the vagina, uterus and ovaries which do not remain stationary, especially the intraparietal and intraligamentous fibromyomata and those seated upon a broad base—indeed, all large new formations of this nature which are not polypoid, that is seated upon a narrow base. Multilocular ovarian cysts also belong to this category.

Preventive measures are most important to obviate the dangerous sequelae of fibromyomata, among which are—

1. A severe form of anaemia, which is permanent, and is caused by the haemorrhages, or later by the bursting of dilated thin walled vessels, and secondary heart disease.

2. Haemorrhages into the structures of the tumour itself. The cause is generally a disturbance in the circulation and thrombosis, which may after operation lead to fatal embolism. These extravasations readily undergo putrefactive changes, and so give rise to sepsis.

3. In large subserous polypi the pedicle may become twisted, and produce necrosis and inflammation in the tumour and in submucous polypi, ulceration and gangrene.

4. Inflammatory adhesions may form between the tumour and intestines.

5. Submucous polypi may, as already mentioned, produce inversion of the uterus, when the polypus is attached to the fundus and numerous strong muscular fibres pass into it from the uterus so that it cannot readily break away. Other consequences are necrosis by pressure and gangrene.

6. By their size, especially when there is cystic degeneration, they may produce symptoms of incarceration and of traction upon the pelvic organs, causing intestinal obstruction, uraemia, cystitis, and secondary pyelonephritis; or they may give rise to difficulties in labour, and they are then especially dangerous if calcification has occurred.

7. Myxomatous degeneration may readily go on to the formation of a myxosarcoma.

8. Primary sarcomatous degeneration and primary cancerous degeneration of the tumour itself or of the fungoid endometrium may occur.

9. The dangers of operative removal are haemorrhage and sepsis; and when removal by abdominal section is necessary peritonitis may occur. This is also true of intraligamentous tumours and large fibromata of the cervix. Infection may arise directly or secondarily by the bursting of an abscess which has formed in the stump.

Finally, pulmonary embolism is much more common than in the removal by operation of other large tumours of the genitalia. All these dangers are the more serious the more anaemic the patient already is.

Preventive treatment in 1, 2, 6, 9 must be directed to keeping the tumour small, to checking haemorrhage, and to improving the general health.

The earliest possible removal of the tumour, to avoid complications and severe anaemia, should be undertaken for 3, 4, 5, 6, 7, 8.

For ovarian cysts there is no preventive treatment possible. When a cyst has attained the size of a foetal head and continues to increase in size it should be removed. If ascites is present with an ovarian tumour immediate abdominal section should be done, because ascites suggests malignancy.

(c) *Malignant Tumours.*

Pigmented naevi of the vulva should be removed, because they tend to undergo malignant degeneration, and the small flat red prominences which may form with pruritus of the vulva should be removed also. At the climacteric any large or weeping wart on the vulva should be removed without previous cauterization.

Eversion and erosions on the vaginal portion of the cervix should be removed either by cauterizing or by excision. The occurrence at the climacteric period of any watery or sanguineous discharge with shreds or foetid odour should suggest a very careful examination of the vagina, cervix, and uterine cavity, the latter with the curette or finger after dilatation of the os. The upper part of the cervix may already be deeply invaded while the infravaginal cervix and the external os show no sign of disease. With the sound a considerable excavation may sometimes be detected. The entire uterus and its adnexa should be at once removed in these cases. Supravaginal amputation of the cervix is admissible only when there is commencing cancerous growth of the vaginal portion of the cervix. We should remember that the obstinate endometritis which occurs at the climacteric, and is called fungoid, is generally only the commencement of a carcinoma. In this case also it is better to operate freely rather than leave it until it is too late.

Even when the cancer is inoperable a palliative extirpation is a prophylactic measure, because according to experience the decomposition is then much less profuse and fistulous openings occur less commonly. The actual cautery may be applied to the infiltrated parts as it checks haemorrhage. Later on atmocausis is applicable.

With regard to sarcoma it must be mentioned that its cause is entirely unknown, that fibromyomata may degenerate into sarcoma, that obstinate multiple flat polypoid growths are malignant or readily become malignant, that sarcomata may appear even in early youth, and that they are more malignant and form secondary growths sooner than do carcinomata.

In sarcoma or carcinoma of the adnexa all measures are

usually in vain, because symptoms make their appearance so late. The most important symptom is ascites.

VI. Gynaecological Operations and Procedures

Every operation, even digital examination or the use of the sound, must be undertaken under strict aseptic precautions, even when decomposition has already occurred or the patient is septic or has gonorrhoea. The uterine sound in rough and unskilled hands is a dangerous instrument: to pass it through a stenosed or spasmodically contracted os uteri may be difficult and at times impossible. If the uterine walls are thin, as in chronic metritis and after abortion, perforation may occur though no sense of resistance has been felt by the operator; the length of sound which has entered makes him aware of the perforation. It is best that he should accept the fact, and not attempt to explain it away and proceed with the operation (curetting, or washing out the uterus), for he would then be directly responsible for the results. The perforation itself has generally no further consequence. Perforation may occur during curetting; this operation should therefore only be performed bimanually, and only blunt curettes with wide ends should be used, and they should not be pushed in and turned round, but carefully passed over the uterine surface. The larger masses left behind after abortion should be removed by the finger; unruptured ova should be expressed.

Intra-uterine irrigation is done with Fritsch's double canula. The return current must be watched because the tube is liable to become blocked with débris. The injection of fluids, such as liquor ferri perchloridi, into the cavity of the uterus must be done carefully during the slow withdrawal of a Braun's syringe. The best way to do it is to fasten a small gauze pad on to the end of the syringe tube, which is provided with lateral apertures. To scrape the sacculated uterine cavity in cases of submucous myomatous formations is dangerous, as decomposition readily sets in. Dilatation

of the cervical canal may be effected quickly by smooth conical metal dilators of increasing size, or by the introduction of laminaria or tupelo tents. The latter should first be made quite smooth and be sterilized by quickly boiling in a five per cent. solution of carbolic acid or by leaving them for several days in a solution of iodoform in ether and alcohol. The vagina and cervical canal must previously be carefully cleansed (see "Foreign Bodies"). Instead of tents firm plugging with iodoform gauze may be used to dilate the cervix.

Concerning the introduction of pessaries prophylactic measures will be found in the chapters on "Prolapse" and on "Foreign Bodies." The prophylaxis in perineoplasty and colporrhaphy will be found in the chapters on "Prolapse" and on the repair of "ruptured perineum," and in the Obstetric section under suture of "recent perineal lacerations." Extensive wedge-shaped excisions of and removal of the vaginal portion of the cervix in metritis and elongation of the cervix and annular hypertrophy of the cervix of a prolapsed uterus give rise to serious difficulties during childbirth owing to the firm scar tissue. In operating we must remember that the hypertrophy is largely only apparent, that is, it is produced by hyperaemia and oedema, and will disappear when the uterus is replaced and still more by measures which produce depletion. For these reasons Schroeder's excision of the cervical mucous membrane in cases of metritis is the best method, because thereby the diseased mucous membrane is entirely removed with its tendency to cancerous change and to eversion, yet the cervical canal is not reduced in diameter.

The prophylactic measures to be observed in the more complex operations are outside the scope of this work.

Prophylaxis in Midwifery

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Prophylaxis in Midwifery

Preventive treatment in midwifery has both a wider and a narrower range. For in the first place the development of the embryo is influenced by the life history of the mother and her physical constitution, and also by the state of health of the father. In the second place disease of the embryo may lead to conditions which are a source of danger to the mother during pregnancy and labour, as for instance hydramnios, hydrocephalus and placenta praevia.

Further prophylactic measures may be adopted even before the occurrence of pregnancy, when an affection of some organ or some constitutional condition exists which we know by experience will be aggravated if complicated by pregnancy, such as tuberculosis and cardiac and renal disease. In other cases again the object of prophylactic treatment is to prevent the establishment of certain conditions during pregnancy labour and the puerperium, which will become a source of trouble in later life, such as enteroptosis.

I. Preventive Treatment during Pregnancy

1. GENERAL MEASURES DURING PREGNANCY

Among these are included not only (1) diet and hygiene during pregnancy, but also (2) the diagnosis of conditions which may make delivery at full term difficult, as contracted pelvis, tumours and vaginal stenosis, in order that they may be removed or a timely induction of premature labour rendered possible; and (3) the cure of existing diseases which might lead to serious consequences during

parturition or the puerperium, especially uncompensated valvular disease of the heart and nephritis.

Avoidable causes of injury to the embryo are excessive hard work, especially heavy lifting, long frequent journeys by carriage or by railway (which cause injury not only mechanically but also through the lumbar centre of the spinal cord), violent movements, such as leaping, and mental excitement.

Among the forms of mental excitement which may be present is fear of the approaching childbirth, and it may be removed by reassuring the patient and by making necessary provisions for her comfort, as by providing a suitable nurse or pleasant surroundings, or getting her admitted into an institution. It is remarkable for example how very much more frequently eclampsia occurs in illegitimate births, even in those cases where the surrounding circumstances are extremely favourable, and the co-operation of some nervous factors cannot therefore well be excluded. Neurasthenic and hysterical women should be kept from all irregularities in food and drink, because these tend to produce disorders during pregnancy which may assume very dangerous proportions, as excessive vomiting and ptyalism. These patients should go to bed early, their food should be easily digestible, and no alcohol or other stimulants should be given. Regular action of the bowels should be procured by diet, mild laxations and enemata. The care of the skin, breasts and abdominal muscles require daily washing with cold or slightly warm water, but not too many warm baths should be taken as they are often badly borne, a bath once a week or fortnight would not be too frequent. The nipples should be drawn out from time to time as a precautionary measure.

Besides the examination of the heart and kidneys, one should examine for tuberculosis, enlargement of the thyroid, varicose veins and diabetes. With regard to the treatment of anaemia and chlorosis, we must draw attention to the fact that overfeeding is useful only during the first half of pregnancy and not during the last half, because it then only goes to nourish the foetus and may thereby make delivery more difficult. For the same reason it is

unadvisable for the patient to take liquids in large quantities. In cases of cardiac disease with absence of compensation, a possible abortion or fatal syncope during or immediately after delivery should be prevented by prescribing digitalis or strophanthus to restore compensation as soon as possible. For nephritis a diet consisting largely of milk should be given, and the kidneys should be relieved by exciting the activity of the skin by hydropathic measures, such as warm baths, massage, wet packs and diaphoretics. For varicose veins elastic bandages or elastic stockings should be worn: they should be put on directly on getting up in the morning. When there is much swelling of the legs the patient should be recommended to lie down frequently. Serious enlargement of the thyroid gland should be treated by excision even during pregnancy.

2. ABORTION: ITS PREVENTIVE TREATMENT

Abortion occurring before the fourth month of pregnancy and formation of the placenta, or occurring before the viability of the foetus in the seventh month, when it is sometimes called miscarriage, may be produced by four groups of causes: (1) General disease from which the mother is suffering. (2) Accidents: a fall or blow—and operations. (3) Disease of the genital organs or an undeveloped condition of the genital organs in the mother. (4) Disease of the foetus and the membranes.

The general treatment in threatened abortion should consist of rest in bed and administration of opiates as suppositories and a light diet. The lower bowel should be emptied by an enema. The prognosis is bad in cases arising from general disease, but is generally good in cases arising from accidents or operative procedures, provided that there is no dilatation of the cervix. The formation of intraplacental haematomata and free haemorrhage should be prevented as far as possible by opiates, by lukewarm or cold irrigations with sterilized salt solution, and by cold water abdominal compresses. Examinations and intravaginal treatment must be conducted with strict asepsis, that no infection may arise if the ovum

later becomes completely separated. To the first group belong acute infectious diseases, such as typhoid fever, cholera, pneumonia, variola, and influenza. These cause death of the foetus by direct infection or by the toxines, or by the formation of subchorionic haematomata which obstruct the circulation, or sometimes by long continued pyrexia. For the latter cause antipyretics are useful. The elimination of toxines may be promoted by diaphoresis, by the action of the bowels, and by injection of normal saline solution (·7 to ·9 per cent.), by the rectum or hypodermically.

Among the chronic constitutional diseases which cause abortion the most frequent is syphilis. Others are diabetes, leucaemia, haemophilia, scurvy and lastly eclampsia arising from renal or hepatic inadequacy. Among organic lesions which predispose to abortion the most important is cardiac disease with lack of compensation. Among neuroses the most important is chorea and among chronic poisons the most important are lead and nicotine. Lead is capable of causing abortion even though present only in the father.

Preventive treatment consists in treating the disease and this without delay. For syphilis, sodium iodide should be given, 2 grains to 15 grains a day; with calomel $\frac{1}{20}$ grain to $\frac{1}{5}$ grain three times a day. The treatment may also be carried out by inunction. Permission to marry should not be given till at least four years, or better still five years, have elapsed since the infection, and three years since the last appearance of symptoms; and treatment by inunction should be ordered immediately before marriage.

For the second group rest in bed is the best treatment for the strain upon the uterine ligaments caused by accidents. In gunshot wounds of the uterine wall premature expulsion of the embryo always occurs. If in its course the shot has perforated the uterus expulsion of the embryo generally begins immediately, or the liquor amnii may rapidly flow into the abdominal cavity and cause the omentum to float into the gunshot track in the abdominal wall and so peritonitis may be set up. Imme-

diate abdominal section is the best treatment, and Czerny has recently recommended this treatment for every perforating gunshot wound of the abdomen. If the ball lodges in the uterine wall premature delivery will ensue in the course of a few weeks, and it is not necessary to perform an abdominal section as a prophylactic measure but merely to watch in case symptoms of peritonitis set in.

Injuries inflicted by blunt instruments seldom cause rupture of the uterus, but produce separation of the placenta with internal haemorrhage. The patient should be put to bed and the pulse watched.

Lacerated wounds of the abdomen and uterus should be treated by a Mikulicz tampon, unless removal of the uterus is indicated because the tissues have been injured beyond possibility of recovery or because the wound is septic.

Operations should be performed during pregnancy when there is urgent necessity for them, as for carcinoma or for tumours which will cause trouble in childbirth. Nephrectomy, also operations for appendicitis and for perforations which will lead to peritonitis may be done when necessary. Any operation may be performed without risk to the embryo, provided only that the uterus is not interfered with ; and as a matter of precaution all interference with the uterus should be strictly avoided. Experience has shown too that operations on the vulva, even incisions, may induce labour pains. Special mention must be made of the great danger arising from injury to the vessels of the vestibule for fatal haemorrhage may arise from this cause.

The question whether further pregnancies should be avoided by patients who have undergone nephrectomy has been answered in the negative by Fritsch, because pregnancy may run a normal course after this operation. The prognosis however in subsequent pregnancies depends entirely upon the condition of the remaining kidney ; a case ending fatally has recently been reported.

To the third group belong endometritis and metritis, retroversion and retroflexion with descent or prolapse of the uterus, and tumours of the true pelvis. The latter should be pushed up into the false pelvis if possible ; they

must be removed if they are incarcerated or adherent or have too short a pedicle. This is described in detail under "Tumours."

If conception has taken place it is obvious that no further local treatment for metritis is admissible.

It is both fortunate and remarkable how seldom the inflammation in metritis spreads to the foetal membranes; and it is only when it spreads that abortion will ensue. Several pathological conditions may result. Haemorrhages into the decidua may occur with the formation of a carneous mole; or hydrorrhoea gravidarum caused by catarrhal endometritis; decidua polyposa, decidua atrophica; or a hydatidiform mole, hydramnios, or placentitis with the formation of infarcts.

Preventive treatment in these cases can only succeed in warding off dangers and sequelae which commonly follow abortion. Strict asepsis should be observed, decomposing ova should be removed as soon as possible, and retained products of gestation must be removed digitally or by the blunt curette. This treatment serves at the same time to prevent that form of endometritis which is liable to follow an abortion, and to prevent subinvolution of the uterus and the resulting chronic metritis. For the same reason contraction of the uterus should be excited by plugging with iodoform gauze for twenty-four hours, and then by the administration of ergot and by hot irrigations. This is the best way of preventing the habitual abortion which results from subinvolution of the uterus or weakened innervation.

In cases of vesicular mole the uterus should be evacuated as soon as possible, and all fragments left behind should be carefully removed from the uterus by the finger or by a blunt curette, because these degenerated villi often grow into the uterine wall and are apt to become malignant. For the same reason the patient should remain under medical observation for several months, and the process of involution of the uterus or possible formation of new growths should be watched.

For hydramnios repeated puncture is sometimes useful.

Abortion does not necessarily follow the puncturing of the membranes, because of the remarkable fact that, in spite of the very great tension of the uterus, the bag of membranes remains lax.

Preventive treatment can do much to prevent habitual abortion in cases of descent of the uterus caused by laxity of the ligaments. A pessary should be worn till the fifth or sixth month of pregnancy, and afterwards an abdominal belt. The prognosis is not so good when eversion of the lips of the os exists, whether as the result of lacerations of the cervix or of laxity of the uterine walls, indeed in the latter case the wearing of a round ring would according to the writer's observation tend to increase the eversion of the mucous membrane.

A retroflexed uterus should be replaced in the third month, unless spontaneous rectification has already occurred. It is still better to insert a lever pessary from the commencement of pregnancy.

In arrested development of the uterus especially of the body of the uterus, as in the infantile form of uterus, the tendency to habitual abortion is successfully treated by uterine tents inserted for twelve to twenty-four hours several days in succession. The tents should be shorter than the cavity of the uterus, and daily hot vaginal douches should be given. The author has also found that a brief application of atmocausis for a quarter of a minute is useful, after the cervix has been dilated for forty-eight hours by tents. In addition general tonic treatment is needed.

3. THE INDUCTION OF ABORTION AS A PREVENTIVE MEASURE IN AFFECTIONS OF OTHER ORGANS

An indication to induce abortion as a preventive treatment is present in only a few cases of disease. It must be noted that the exanthemata, such as smallpox and measles, render the foetus immune, either by the action of their toxines, or because traces of the infection reach the foetus. Threatening abortion is a sign of the severity of the illness and generally of bad prognosis for the mother, so that the induction of premature labour is of no use whatever.

On the other hand vaccination of the mother during pregnancy does not render the newborn infant immune. In the rare febrile Impetigo herpetiformis gravidarum, good results follow the induction of premature labour, possibly because the disease generally first appears in the middle of pregnancy.

Induction of premature labour cannot be recommended for cardiac and pulmonary affections except in a few special cases. The indications for and against may be formulated thus—There must be some special indication with regard to the patient which requires that premature labour should be induced, not because it is desirable to bring about a premature delivery, but because it is desirable to end the pregnancy, and because it seems probable that premature termination of the pregnancy will be more favourable for the patient than delivery at full term; for the chief dangers arise during labour from its length and severity, and after delivery from the circulatory changes which occur during the puerperium.

The first object of preventive treatment in cardiac lesions must be to obtain compensatory hypertrophy in the heart, by the administration of strophanthus and digitalis, except in aortic incompetence. When compensation cannot be restored the successful issue of the induction of abortion will depend upon the rapidity of the expulsion of the ovum and upon the month of pregnancy reached, that is upon the expulsive force required to complete delivery. The latter is indeed less in premature births, but on the other hand a premature labour is apt to be more prolonged. It is best to puncture the membranes, because this affords immediate relief. The good effect of the induction of premature labour is seen in those cases in which unfavourable symptoms arise, not from the shock of the expulsion of the embryo, but rather from the long duration of the strain upon the heart and circulation, especially in aortic valvular disease. We must be guided too in our decision by the experience that prolonged strain upon the heart is of worse prognosis for those women who work hard, for those in whom the cardiac lesion appeared early in life and for multiparae. Further

we must take into consideration the state of the heart muscles, whether myocarditis or degeneration is present as a complication.

Threatened collapse is best prevented by injections of ether and of camphor, or even by venesection; ether is useful even for anaesthesia. The treatment directly after the expulsion of the foetus is important; a sand bag should be placed upon the abdomen to prevent sudden collapse by the reduction of blood pressure in the abdominal cavity, and ether should be given, but never ergot. Post partum haemorrhage is of less serious import than usual, because it relieves the heart.

Seeing that the induction of premature labour is undertaken under such very unfavourable conditions, it is best to explain to the relatives what are the risks and the gravity of the prognosis. In forming a prognosis we must take into consideration too any complications which may exist, whether renal, gastric, intestinal or hepatic, because the retention of toxins resulting from disease of these organs acts as an additional burden upon the heart.

Even without these latter complications we find, as has been mentioned above, that degeneration of the heart muscle, early appearance of the cardiac lesion, and serious failure in cardiac compensation render the prognosis much more unfavourable, especially in weakly and very anaemic patients and in cases where the conditions of life do not permit of the necessary care being taken. Medical consent to marry should not be given to girls so affected. The number of pregnancies in such cases should not exceed two.

In pulmonary affections, especially in phthisis, the effects of parturition are not less serious; those are the loss of blood, the muscular exertion, and a tendency to cardiac inadequacy with consequent oedema of the lungs. For these reasons the induction of premature labour should not be undertaken, though artificial abortion may be advisable in cases where it appears probable that the end of pregnancy will not be reached or will be reached under very serious conditions. In these cases of chronic organic disease the

question may arise whether it is justifiable to produce sterility in the woman by obliteration of the uterine cavity by repeated application of steam, or by removal of the ovaries, or by excising the Fallopian tubes and closing the uterine apertures.

Similar indications will guide us in deciding upon the induction of abortion prophylactically in diseases of metabolism and nervous affections caused by retention of the toxins of metabolism, that is by auto-intoxication. The most serious and most common of these affections are excessive vomiting at the beginning of pregnancy and eclampsia towards the end of pregnancy. Others are ptyalism, uncontrollable diarrhoea, icterus gravidarum, diabetes, haemophilia, scurvy, exophthalmic goitre, many forms of neuritis, and a severe form of chorea, which has a mortality of thirty per cent. and premature delivery in twenty per cent. of the cases. Epilepsy, hysteria, tetany, myelitis and various psychoses may also occur. The general prophylaxis for all these disorders consists in suitable hydropathic treatment and in improving the general health. It is more important still that this plan of treatment should be followed when pregnancy has occurred, especially for the reflex neuroses which are associated with hysteria.

For excessive vomiting in mild cases, increase of its severity may be prevented by a light or fluid diet, though milk is unfortunately often badly tolerated even with the addition of lime water, or when boiled with starch flour. A strong exercise of the will and determination not to yield to the inclination to vomit is also of great value. A cautious examination of the generative organs should be made to determine whether retroflexion of the incarcerated gravid uterus is present or some anomaly of the ovum, such as vesicular mole, missed abortion or hydramnios.

In these cases puncture of the membranes and dilatation of the cervix are often of use in addition to a pessary, and are not followed by abortion. Vomiting caused by dyspepsia is best treated with orexin 5 grains to 8 grains in capsules two or three times a day. In the severer forms of uncontrollable vomiting, the stomach must be given

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complete rest to prevent serious consequences, or even fatal results. Nourishment must be given entirely per rectum; at first normal saline solution, then oatmeal water, then white of egg in water, and lastly nutrient enemata of milk, egg, butter and sugar. The author has found alkarnose enemata very satisfactory. Sometimes enemata may at first cause retching and bilious vomiting. In patients who have become much emaciated the action of the heart may be so seriously impaired by deficiency of fluid in the body and by an overloading of the tissues with toxines, that it becomes necessary to have recourse to hypodermic or to intravenous injections of sterilized normal saline solution.

But these are the cases for which induction of abortion is the right treatment and is successful if not done too late. The condition of the pulse is the best guide, for death has occurred even after spontaneous or artificial abortion when weakness of the heart's action is too far advanced.

The same holds good for uncontrollable ptyalism and diarrhoea, which reduce the patient's strength by loss of sleep and loss of albuminous fluids. For both these disorders treatment consists in stimulating the action of the skin by hydrotherapy and in promoting diaphoresis and diuresis, but if these are unsuccessful nothing can be done except induction of abortion.

In all these cases the use of narcotics is strictly contra-indicated.

For chorea with very severe symptoms, especially with insomnia, induction of abortion offers the only chance of saving life. In leukaemia and in pernicious anaemia an improvement in the patient's general condition has followed the induction of abortion. In very bad cases of exophthalmic goitre abortion occurs spontaneously; if it does not occur the prognosis is good.

Artificial abortion is strictly contra-indicated in all diseases of the blood, and treatment consists in injections of 20 cubic centimetres of a 2 per cent. gelatine emulsion, or of a 10 to 20 per cent. emulsion per rectum. Calcium hypophosphite may be given to the extent of 2 drams per

day by mouth, or 3 drams per rectum. Sodium iodide may also be prescribed.

Diabetes is considerably aggravated by pregnancy, and tends to premature expulsion of the ovum during the latter half of pregnancy. It should first be treated by dieting and by regularity of living. The induction of premature labour is indicated in those cases only where it is impossible to reduce the excessive excretion of sugar, and where there is rapid deterioration in the general condition of the patient; but such cases are extremely rare. The embryos are often of low vitality. Women who have diabetes should not marry.

In renal disease, with a tendency to eclampsia towards the end of gestation, or with retinitis albuminurica, much may be done during pregnancy to relieve the kidneys which are affected by Bright's disease. The patient should be treated by hydropathic "packing," and not by the induction of premature labour. But when serious symptoms arise which threaten life, such as an extreme degree of dropsy and retinitis, with vision less than one-sixth, it becomes necessary to consider the advisability of inducing premature labour as a preventive measure. But it must be remembered that measures intended to excite labour pains will also reflexly excite attacks of eclampsia, or if eclampsia has already appeared will increase the fits to a dangerous extent. Preventive treatment for eclampsia consists in elimination of the toxines from the blood as speedily as possible, and in relieving the kidneys and cerebral congestion by exciting diaphoresis by baths and by wet packs. The eclamptic convulsions may be checked by chloralhydrate or morphia, and by the avoidance of everything that tends reflexly to produce them, such as noises in the room, vaginal examinations and futile attempts to bring about delivery. For all obstetric procedures the patient should be under the influence of chloroform.

Thus in the preventive treatment of general diseases, and of disease of organs other than the generative, the indications for the induction of abortion or of premature labour depend entirely on the individual case, and are not

sharply defined or absolute. In the preventive treatment of anomalies of the pelvis and of the generative organs however the indications for the induction of abortion are definite and exact.

A. Indications for the induction of abortion up to the fourth month:

(*a*) Great pelvic contraction, the shortest diameter being 2 inches or less, where a viable child of thirty-four weeks could not be delivered; and a mature child could not be delivered by craniotomy.

(*b*) The presence in the true pelvis of a tumour which cannot be removed or reduced in size or pushed out of the pelvis. This indication is rarely present except in carcinoma of the uterus.

(*c*) Displacement of the uterus which cannot be reduced, especially retroflexion caused by adhesions, or with suppuration.

(*d*) Hydatidiform mole.

B. Indications for the induction of premature labour if possible not till after the thirty-fourth week:

(*a*) Pelvic contraction, according to the following rules: In the thirty-fifth week when the true conjugate is slightly over 3 inches, or in generally contracted pelves even when the conjugate is $3\frac{1}{2}$ inches, or in infundibular pelves when the transverse diameter at the outlet is 3 inches.

In the thirty-third to the thirty-fourth week, for a true conjugate of 3 inches, with $2\frac{1}{2}$ to 3 inches between the tuberosities in an infundibular pelvis.

In thirty-first to thirty-third week for a true conjugate of $2\frac{3}{4}$ to 3 inches.

Before the thirtieth week for a true conjugate of $2\frac{1}{3}$ to $2\frac{3}{4}$ inches.

With a true conjugate of $2\frac{1}{3}$ inches the induction of abortion is generally required.

With regard to further preventive treatment, it must be mentioned that by a suitable diet consistently and regularly followed, children decidedly thinner than usual are in many cases brought into the world. The food should be such as does not form much fat or much liquid. If any

good is to be attained from this method, it must be employed sufficiently early.

(*b*) Placenta praevia with serious haemorrhages.

(*c*) Habitual death of the foetus at a certain time.

(*d*) Hydramnios with great danger to the mother when it obstructs the diaphragm and causes great disturbance of the circulation.

4. PREVENTIVE TREATMENT FOR ANOMALIES OF FORM AND OF POSITION OF THE UTERUS DURING PREGNANCY

Want of space and circulatory disturbances may in these cases lead to spontaneous abortion, or more frequently to premature delivery, and in very rare cases may make it necessary to induce labour.

(*a*) The dangers arising out of anomalies of development are on the one hand laceration of the distended uterine cornu in uterus unicornis and bicornis, and in uterus didelphys; and on the other hand obstruction of the pelvis by the other cornu. The question of the preventive treatment depends upon our diagnosis of the case, and unfortunately there is very little experience to guide us.

The preventive treatment for pregnancy in a rudimentary uterine cornu with atresia is the same as that for extra-uterine gestation; the results of both conditions are the same.

(*b*) In retroflexion of the gravid uterus the uterus must first be replaced and then kept anteflexed by a lever pessary from the first to the fifth month, which should be taken out occasionally and then reinserted. By this treatment we prevent incarceration of the uterus with its serious consequences. Among these are abortion, severe reflex phenomena, such as uncontrollable vomiting and ptyalism, difficulty in micturition, with subsequent gangrene of the bladder, and lastly rupture of the bladder.

The bladder and the bowel must be emptied before any attempt is made to replace the uterus. The attempt often fails, and it then becomes necessary to draw down the cervix by vulsellum forceps, and to push up the body of the uterus by pressure, either through the posterior

vaginal vault or through the rectum, or finally by the hand on the abdomen. This can be done most easily when the patient stands upright, or is placed so that the pelvis is raised—that is, the knee-elbow position. There is often difficulty and danger in passing the catheter, and sometimes it becomes impossible till the vaginal part of the uterus has been lifted and pushed away from the symphysis. In other cases all attempts are in vain, and to use force is always dangerous. For these cases we use the slow steady pressure exerted by Meyer's elastic ring pessary or by a dilatable vaginal bag. Sims' lateral position, or the knee-elbow position, is best for this purpose. While filling the dilatable vaginal bag with sterilized fluid, care must be taken not to make the bag too tense, as lacerations of the vagina have been produced in this way.

When all efforts to introduce a catheter have failed, as force must not be used lest the bladder should burst, it must be punctured through the vagina, so that the urine may not infiltrate the connective tissue around the bladder, or the bag of membranes may be punctured through the posterior vaginal vault. If the cervix and the cervical canal are within reach, and the canal is patent, it is best in these cases to induce abortion by passing a bougie, and by plugging with gauze soaked in glycerine. The uterus may be rapidly emptied of the contained ovum by an incision into it made through the posterior vaginal vault. On the other hand abortion may be prevented by replacing the uterus from above, that is by an incision through the abdominal wall.

(*c*) Descent and prolapse of the uterus readily lead to abortion. It may be prevented by the use of a pessary till the fifth month. Plastic operations, such as colporrhaphy, perineorrhaphy, are also practicable, and are especially useful when excoriations of the os uteri are combined with prolapse, because in case of spontaneous abortion such excoriations readily become infected, and may lead to serious consequences.

The best preventive treatment in all case of anomalies

of position is their rectification before conception takes place.

(*d*) There are several varieties of anteflexion which give rise to symptoms in pregnancy, some of which are very troublesome and serious. One form is infantile anteflexion, which predisposes to abortion, and is often associated in primiparae with excessive vomiting, according to the author's observations. Other anteflexions occur in consequence of lax ligaments and of a lax abdominal wall, and in flattened pelvis, which causes a pendulous abdomen. Lastly anteflexion may be caused by vaginal or vesical fixation, or more rarely by ventrifixation; these fixations, as well as those produced in other ways, may lead to the formation of pouches in the uterus. Abortion is frequent in cases of antefixation. The induction of abortion is indicated when the embryo in its development causes overstretching and great tension of the posterior uterine wall, and when at the same time the vaginal portion of the cervix is pulled backwards.

The best preventive treatment is to avoid hysteropexies during the years when childbearing is possible, for they are capable of producing these uncontrollable adhesions.

A pendulous abdomen should be supported by means of a strong wide belt which fits the convex form of the abdomen. This will prevent overstretching of the abdominal fasciae and separation of the recti, and thus from the very first will prevent a faulty position and faulty presentation of the embryo. Hydramnios and twin pregnancies also predispose to this condition.

Laxity of the ligaments combined with rickety pelvis, and also infantile anteflexion of the uterus are found in hysterical, neurasthenic and chlorotic young women. Preventive treatment should be early begun to remove these conditions of weakness.

(*e*) For the rare cases in which the pregnant uterus is found in a hernia, ventral, inguinal or femoral, preventive treatment consists in reduction, or in artificial abortion, or in herniotomy and removal of the uterus or uterine horn. The best treatment of all is for the patient to wear a strong

truss before pregnancy occurs or to have a radical cure performed.

5. PREVENTIVE TREATMENT FOR TUMOURS OF THE GENERATIVE ORGANS IN PREGNANCY

Tumours may interfere with pregnancy by obstructing the true pelvis. The tumours may be derived from pelvic organs or may have come down through the pelvic brim, as for instance a floating kidney or a hydronephrosis.

(*a*) For fibromyomata great experience is required in deciding what is the right treatment for any given case. The following questions must first be answered: "Have serious symptoms already appeared during the pregnancy?" "Do we think that such symptoms will appear before the time when the child is viable?" "Will labour at full term cause dangerous conditions which it will be very difficult or even impossible to overcome, and thus endanger the lives both of mother and child?" "Is the immediate removal of the tumour less dangerous than if longer delayed? and must the ovum be removed at the same time? or will it suffice to induce premature labour?"

The answers depend upon the situation and size of the tumour.

The dangers in so far as the embryo is concerned are many. First, conception is difficult or impossible because of the presence of large or polypoid fibromata, or because of the resulting changes in the endometrium. Next, abortion may occur with possible retention of parts of the ovum and decomposition. Other possible results are malformations of the foetus through want of sufficient space, placenta praevia or even tubal gestation.

The dangers during pregnancy which arise from the tumour are incarceration of the tumour under the promontory of the sacrum; or torsion of its pedicle, followed by strangulation, which may also be produced by disturbances of the circulation and haemorrhages when there is a tendency to thrombosis of the veins of the uterine appendages. A further danger is a marked increase in size of the tumour owing to oedema and to fibrous growth. Even when the

shape and situation of the tumour are such that it will not cause difficulty during labour, central hæmorrhages and softening readily occur, and may give rise to sepsis.

Experience has shown that we should be guided by the following rules for treating tumours:

Small fibroids of the body of the uterus should be left untouched. Cervical polypi should be removed at once in the simplest and most careful way possible. If the fibroids are upon a broad base in the cervical wall, they should be left till the time of childbirth; and the same holds good for submucous fibroids.

With large cervical fibromyomata which obstruct the passage we have to consider whether it is possible either now or later to push the tumour out of the way or to remove it; and here our knowledge both of the increase in size and of the change in form of myomata from the effect of labour pains is of value. Labour pains have often easily accomplished what energetic efforts to push the tumour out of the way have failed to do under an anaesthetic. No attempt should be made to alter the position of the tumour before the eighth month for fear of producing abortion, except when there are symptoms of incarceration. If the tumour cannot be pushed out of the way it must be removed by abdominal section.

The same considerations, as to the possibility of altering the position of the tumour, apply to subserous fibroids which become fixed in the pelvis beneath the pregnant uterus. In some cases the induction of premature labour is indicated, according to the rules already given for the induction of labour in contracted pelves.

After such induction of labour and after spontaneous abortion all retained products of conception should at once be removed to prevent sepsis. If septic infection is already present, the uterus and tumour should be removed without delay to prevent a general septic infection.

Removal of the fibroid by abdominal section is best undertaken at the end of pregnancy, and may then be looked upon as a curative and not as a preventive procedure. It is a preventive measure only when performed for some

threatening danger, such as torsion of the pedicle or irreducible incarceration, decomposition, or when the fibroid is complicated with disease of some other organ, especially cardiac, pulmonary or renal affections, so commonly seen in patients with myomata. In many cases, as when the tumour is already infected, total extirpation is advisable.

(*b*) Ovarian tumours should generally be removed during pregnancy without further consideration, and this is best done during the early months: even double ovariotomies very seldom cause abortion. The induction of abortion instead of removal of the tumour is not indicated, except when the tumour is generally adherent in Douglas' pouch, or is situated within the folds of the broad ligament.

Ovariotomy should be performed when certain dangers in pregnancy have arisen or are anticipated. These dangers do not arise from an increase in size, as is the case with myomata, but from circulatory disturbances, such as hæmatomata and thromboses, produced by the uterus as it rises in the abdomen and drags upon the pedicle. A further danger is torsion of the pedicle, resulting in necrosis of the tumours, which affords a *locus minoris resistentiae* for infection, or which may give way if there is softening of the wall. The danger with small tumours is that they may become fixed beneath the promontory of the sacrum, and fibromata which cannot be punctured may completely obstruct the pelvis. Incarceration of the retroflexed uterus, followed by abortion or by prolapse of the uterus, is produced by large tumours which obstruct the pelvic brim.

(*c*) The preventive treatment in carcinoma of the uterus consists in: (1) For operable cases, the whole uterus should at once be removed. During the latter half of pregnancy, before the viability of the foetus, this should be done after previously removing the ovum by an anterior vaginocervical incision. From the thirty-second week onwards, by induction of premature birth by deep incisions in the cervical wall and vaginal extirpation of the uterus; but if the cervical canal cannot be sufficiently dilated, the foetus must be delivered by Caesarian section, and then the body of the uterus be amputated by the supravaginal operation,

while the cancerous cervix is removed per vaginam. (2) In inoperable cases the utmost must be done to preserve the life of the mother, and so save the child. Palliative measures should be used to check growth and decomposition, as by the use of the thermocautery, atmocausis, or cauterizing with chloride of zinc.

When it is desired to induce premature labour, and the cervical canal is impassable through the presence of an inoperable malignant mass, Caesarian section must be performed, and then as a preventive measure supravaginal hysterectomy should be performed to prevent infection.

6. PREVENTIVE TREATMENT OF EXTRA-UTERINE GESTATION

To prevent extra-uterine gestation the causes which most frequently lead to it should be removed. Amongst these are all forms of inflammation of the generative organs; gonorrhoeal inflammations, which may cause or have already produced salpingitis, tuberculous salpingitis and perioöphoritis, as well as all pelvic congestions.

When a diagnosis of ectopic (generally tubal) gestation has been made, definite prophylactic measures should be taken to prevent serious consequences.

The most favourable course relatively is the bursting of the embryo sac during the first two months, followed by absorption of the retro-uterine hæmatocele so formed and of the ovum. In the later months fatal haemorrhages and decomposition of the embryo readily set in. There is not complete unanimity as to the treatment which should be adopted.

1. During the first three months injections of one-third grain of morphia may be made into the embryo sac on two occasions, without aspiration of the liquor amnii, and with strict aseptic precautions, to kill the embryo.

2. If the ovum continues to grow in spite of this treatment, or if, especially in obscure cases, the symptoms are serious and urgent, the embryo sac should be removed by abdominal section, or if it is distinctly pedunculated, movable and small it may be removed per vaginam.

3. In rare cases when the foetus is still alive and has reached the thirty-second week, abdominal section should generally be performed in order to remove as far as possible the dangers with which the mother is threatened. In exceptional cases when the mother urgently desires it for the child's sake, one may wait till the thirty-fifth week, and then deliver the patient by abdominal section. In these cases all possible precautionary measures should be taken to prevent bursting of the embryo sac; the patient should be kept in bed, opiates given, and if serious symptoms appear we must at once proceed to open the abdomen. It is best that the patient should be in a hospital.

4. If the rupture of the sac has occurred the abdomen must be opened and the bleeding vessels ligatured to prevent a fatal result from the continuance of intraperitoneal haemorrhage, but this is only practicable when a few hours have elapsed and collapse is not too severe.

5. When an intraperitoneal haematocele has formed and there are no symptoms of further internal haemorrhage, measures should be taken, preliminary to eventual operative treatment, to assist in preventing further ill effects. Thus the patient should be kept in bed with the pelvis raised, a sand bag placed upon the abdomen, and the coagulability of the blood increased by giving calcium hypophosphite, or injections of ·8 or ·9 per cent. sodium chloride solution, or of 2 per cent. gelatine emulsion.

If fever appears, pointing to sepsis or suppuration, further danger must be avoided by a timely incision through the vaginal vault or abdominal wall.

7. PREVENTIVE TREATMENT IN PLACENTA PRAEVIA

Placenta praevia, with the serious consequences arising from the low attachment of the ovum, may be prevented by removing the primary causes which produce it, and we are able to do this in some cases, for example in chronic endometritis and metritis, submucous fibroids, subinvolution of the uterus and lacerations of the cervix.

Among the consequences of placenta praevia haemorrhage from the detached lower part of the placenta is the most

serious. This may begin during pregnancy through the stretching of the lower uterine segment, or may not begin till labour sets in. For these reasons preventive treatment consists, not only in checking the haemorrhage, but also in raising the power of resistance of the patient from the moment that a probable placenta praevia is diagnosed by the occurrence of frequent metrorrhagia.

The induction of premature labour is indicated when the haemorrhage is profuse. This is accomplished by dilating the cervix with a hydrostatic dilator and rupturing the membranes to prevent further detachment of the lower part of the placenta, and in cases where the head does not descend by performing version and bringing down a leg.

Great care should be taken to ensure perfect asepsis and to prevent much air entering, which might easily reach the utero-placental veins and cause air emboli. When rupturing the membranes we should look out for vessels on the chorion, as insertio velamentosa is not a rare occurrence in cases of placenta praevia. The third stage of labour should be closely watched, abnormal separation of the placenta with post partum haemorrhage being almost the rule.

II. Preventive Treatment during Delivery

1. GENERAL PREVENTIVE TREATMENT FOR ABNORMALITIES OF THE PELVIS

To prevent abnormal development of the pelvis the causes which produce it must be treated, in most cases during early childhood or at puberty. The chief causes are defective general development of the body—which produces the "generally contracted pelvis," funnel shaped pelvis and dwarf pelvis—and rickets. These causes may in most cases be removed by suitable regulation of the conditions of life and diet and by the administration of phosphorus. With the strengthening and the better development of the bones of the body, the tendency to abnormal development of the pelvis disappears. During the period while the bones remain soft the patient should walk as little as possible,

so that the pelvis may not have any great weight to bear, and at puberty these patients should not lift or carry heavy weights. The development of the bony genital canal is much influenced by tuberculosis although indirectly—partly through lateral curvature of the spinal column leading to tilting of the pelvis, and partly by the formation of oblique pelvis through disease of the hip and synostosis. Apart from these contractions and displacements of pelvic diameters which are of importance in obstetric practice, exostoses arising most commonly from rickets, less often from fractures or overgrowth, may give rise to serious conditions by the injury they inflict on the soft parts.

Even when the unfavourable conditions produced by such abnormalities are to a considerable extent compensated for by the yielding of joints and by the compressibility of the foetal skull, yet, excluding the mere obstruction to delivery of the child, injuries may result either to the soft parts, such as the uterus and vagina, to the joints, or to the foetal skull bones. The more abnormal the position and presentation of the child, the earlier the membranes rupture before dilatation of the os, and the more violent the labour pains are, the more readily will lacerations of the maternal soft parts be produced.

Preventive treatment is of great value in these cases. The results of experience show that when all complications which add to the difficulty have been removed, nature is able to bring about spontaneous delivery in 70 per cent. of the cases of contracted pelvis. The limit to the degree of contraction in which delivery may run a smooth course is, according to Litzmann, in a true conjugate of $3\frac{1}{2}$ inches; and when this limit is exceeded anomalies in position and in presentation are found in a markedly greater number of cases.

To prevent the results which may follow from a contracted pelvis treatment should be commenced during pregnancy, as soon as the diagnosis of contracted pelvis has been made. When the degree of contraction is very great the induction of premature labour or even the induction of abortion may be indicated, in accordance with

the rules laid down under "Artificial Abortion." For slighter degrees of contraction it is possible by frequent warm baths and by work and active exercise in the open air to prevent the regular duration of pregnancy from being exceeded; indeed labour pains may thereby be made to set in a fortnight earlier (Ahlfeld) and the child be full timed though with very little fat upon it. The same principle may be carried out by Prochownik's dieting which has been referred to above. During the last month it is useful to place the child so that it lies as in a vertex presentation and to press the skull into the pelvic brim; it should be done for several minutes at a time, several times a week. If labour has set in the bag of membranes should be kept intact as long as possible, and when they have broken we must prevent the further escape of liquor amnii. For the latter purpose a hydrostatic dilator should be inserted; it is a fiddle shaped elastic bag which is then filled with sterilized water or a weak antiseptic solution (Barnes and Fehling). The pressure of the head upon the still undilated os uteri produces oedema of the lips and leads to fissures and sepsis; it also prematurely excites very strong and painful labour pains and abdominal efforts, which are often rendered ineffectual by partial tetanic spasm. This too is prevented by the use of hydrostatic dilators, which causes dilatation of the cervical canal. If the external os is still quite closed the vaginal dilator is used only when there is a complete cessation of pains.

This is for vertex presentations. But if the vertex does not enter the pelvis and the pains become violent and almost uninterrupted, and if any contraction ring is plainly made out, which is rising towards the umbilicus while the region of the bladder is flat and very tender, then it becomes necessary to diminish the intensity of the pains by applying mustard leaves, or very hot cloths, or employing opium suppositories, or the inhalation of ether or chloroform even to the stage of deep anaesthesia. An examination should be made to see whether the position of the head is favourable or unfavourable, and with this we must take into consideration too the particular kind of abnormality of pelvis which

is present. Rules for these are given in the following paragraphs.

The condition above described readily leads on to tonic spasm of the uterus and then to rupture of the uterus. The same result will occur if a transverse presentation has been assumed by the child when the liquor amnii has escaped. While the bag of membranes is intact a rupture is improbable. Preventive treatment in transverse presentations consists in podalic version. Only very rarely is cephalic version advisable, and that is when the relations between pelvis and head are very favourable. Faulty presentations are often produced by faulty postures in pregnancy, arising from lax abdominal and uterine walls, as with a pendulous abdomen with anteflexion of the uterus, and these can be easily corrected when labour begins. Further, anomalies in position may be caused by premature rupture of the membranes in flat pelves and the carrying down of limbs or of the umbilical cord by the escaping liquor amnii, when the promontory projects and the head cannot descend to fill the cervical canal. These anomalies must also be speedily removed to prevent secondary faulty presentations such as brow or face presentations, and to prevent direct danger to the child's life when the cord has prolapsed.

Even when the head has entered the pelvis it may nevertheless, especially in generally contracted pelves, become incarcerated or remain fixed, and extraction by forceps or perforation becomes necessary. This must not be delayed too long, and the forceps should be very carefully used to avoid any risk of splitting open the pelvic joints, or lacerations and bruising of the soft parts, which would lead later to the formation of fistulae. In infundibuliform pelves the head sinks deep into the pelvis and rests upon the ischia. There is no danger of laceration through dilatation, but injuries are caused by the severe pressure or by the forceps, and when the labour pains are strong the head should not be allowed to remain fixed for long.

Preventive treatment has three objects in these cases: (1) The removal of obstruction caused by faulty presenta-

tion and posture of the child, by too early and too copious loss of liquor amnii and by abnormalities in the labour pains. (2) Aseptic precautions and the avoidance of too early interference. (3) Timely interference to prevent injuries to mother and child.

A careful consideration of the advance and of the rotation of the head, and of the strength of the pains, gives the conditions for the posture which should be assumed. The difficulty caused by too short a conjugate may be lessened by putting the patient in Walcher's "hanging posture," because when the legs are allowed to hang down the distance between the symphysis pubis and the promontory is increased. If we notice that the advancing part of the child always tends to one side the patient should be placed on that side. By this lateral posture the trunk of the child with the fundus uteri falls towards that side and the advancing part of the child is brought exactly over the pelvic inlet. It is useful too to press the head into the inlet with every labour pain.

When the head does not enter the pelvic brim podalic version is required in those cases where the true conjugate is not less than $2\frac{3}{4}$ inches. By "version as a preventive measure" we understand those versions which are undertaken when there is only moderate contraction of the pelvis, either because the advancing head tends again and again to pass to one side, or because we gather from the previous history given by the patient that vertex presentations have previously always ended unfavourably, whereas a pelvic presentation has ended favourably.

In generally contracted pelves a true conjugate of $2\frac{1}{2}$ inches is the lowest limit. In the infundibular pelvis a distance of 3 inches between the tuberosities of the ischia, the other diameters at the outlet being normal, is the limit for application of forceps.

But if the distance between the tuberosity of the ischium and the apex of the sacrum is only $2\frac{3}{4}$ inches, the normal distance being $3\frac{3}{4}$ inches, then the distance between the tuberosities of the ischia must not be less than $3\frac{1}{2}$ inches; and this applies also to cases where the conjugate at the

Flattened Pelvis. True Conjugate.	Child.	Head movable above the Pelvic Brim.	Head fixed in the True Pelvis.
2¾ inches to 4 inches.	Living.	Version . . .	Forceps.
	Dead .	Perforation or version.	Perforation; craniotomy forceps.
2⅓ inches to 3 inches.	Living.	Symphysiotomy in multiparae.	
	Dead .	Version . . .	Perforation; craniotomy forceps.
2 inches to 2¾ inches.	Living.	Wait; but if danger to the mother, perforation, or possibly Caesarian section.	
	Dead .	Perforation and craniotomy forceps or embryotomy.	
Under 2 inches . . .	Living or dead.	Absolute indication for Caesarian section.	

narrowest part of the pelvic cavity is reduced to 3½ inches, the normal being 4½ inches. Below these limits perforation or symphysiotomy is indicated, unless the distance between the tuberosities is less than 2 inches, and then Caesarian section becomes necessary.

2. SPECIAL PREVENTIVE MEASURES DURING PREGNANCY AND CHILDBIRTH FOR THE VARIOUS FORMS OF ABNORMAL PELVIS

In the generally-contracted pelvis we must prevent the presentation from becoming a fronto-anterior or a brow presentation, and must secure an occipito-anterior presentation, because experience has shown that when the occiput sinks very low it is possible for the head to pass. It may be aided by putting the patient in the lateral posture, on the side on which the occiput lies, and by manually assisting the rotation of the head. The same holds good for the after-coming head in pelvic presentations: it should be pressed into the pelvic brim and the chin be kept in close

contact with the breast. Eclampsia occurs frequently with this kind of pelvis, and we should be on the lookout for its premonitory signs.

With regard to all preventive treatment, including the induction of premature labour, we must bear in mind that we have to consider not only the degree of contraction of the true conjugate, but also the fact that this is complicated by contraction of all the other diameters.

When the head is fixed and the pains are strong but no progress is made, it is best not to wait too long, especially when the child is dead or its life endangered. There is great danger of injury to the tissues by pressure, and forceps should not be used at all, or only with great caution, if the child is still alive.

The best preventive treatment, when the diagnosis is made sufficiently early, is the induction of premature labour.

In the simple flattened pelvis the preventive treatment is that of rickets and the induction of premature labour given above.

The pregnant and retroflexed uterus which has become incarcerated should be replaced in its normal position during the second month. For a pendulous abdomen an abdominal belt should be worn; it should also be worn during parturition when the uterus falls too much forwards or too much to one side, as this tends to produce lateral flexion of the child's cervical spine and extreme obliquities of the head; the uterus may also be supported by cushions. It should be remembered that moderate obliquity with descent of the narrower frontal region into the pelvic brim is favourable and should be encouraged.

In a flattened pelvis which will not allow the head to pass through, the imminent danger of rupture of the uterus must be prevented by the methods already described. The premature rupture of the membranes must also be prevented, for it predisposes to rupture of the uterus and favours prolapse of the umbilical cord or of a hand or foot. The strength of the labour pains must be restrained if necessary.

In the generally-contracted and flattened pelvis all these

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difficulties during pregnancy and at childbirth are increased. This pelvis, so far as the pelvic cavity is concerned, has all the peculiarities of a simple generally-contracted pelvis, and descent of the forehead must be prevented and an occipital presentation be brought about. Presentation of the forehead may, in this form of pelvis, much more readily necessitate perforation and destruction of the child. A combination of posterior parietal and occipital presentation is very favourable.

In osteomalachic and similar pelves the prognosis of childbirth depends less upon the degree of deformity than upon the question whether the pelvis is soft or has become ossified and rigid. Phosphorus should be given at the very first appearance of well marked symptoms: these are pains in the bones, first in the horizontal pubic rami; cramps in the muscles; softening of the bones, occurring first at the pelvic outlet; and a waddling gait.

In malacosteon pelves spontaneous delivery or delivery by forceps is possible. One need therefore only try to obtain a favourable position and presentation of the child.

With a rigid rostrated pelvis the danger of laceration must be prevented; it varies with the degree of contraction, and Caesarian section may possibly be required.

In funnel shaped pelves the rotation forwards of the occiput must be assisted. Timely and cautious interference is required. Possibly symphysiotomy may be advisable to prevent injurious pressure and straining of the sacro-iliac articulations.

In oblique pelves with a considerable degree of contraction of one half, there remains only the other half of the pelvic inlet, and the conditions are similar to those of the generally contracted pelvis, and an occipital presentation is the most favourable. An endeavour must be made to bring the sagittal suture into the shorter oblique diameter, so that the descending occiput may be turned towards the flattened or narrowed half of the pelvis. Naegele's oblique pelvis, produced by an asymmetry of the alae of the sacrum and synostosis, is of worse prognosis than the oblique pelvis produced by scoliosis or anchylosis; for in

the Naegele pelvis forceps and version are almost invariably harmful.

3. PREVENTIVE TREATMENT OF LACERATIONS OF THE UTERUS

Among the rare lacerations of the uterus during pregnancy very few afford an opportunity for preventive treatment, since most of them are the result of criminal attempts to procure abortion or are ruptures of rudimentary uterine cornua. Old scars, after Caesarian section, which have given way form the remainder. The suturing should therefore be very carefully done in this operation. The use of catgut and inclusion of the endometrium in the stitches are now condemned. Various operators have however had very good results with both. Müller always sutures the endometrium independently by itself.

The chief point of importance seems to be an exact adjustment of the edges of the wound in the uterus and the avoidance of sutures which are too tense. If the condition of the patient admits of it, the serous coat should also in addition be separately sutured. The preventive treatment of ruptures of the uterus which occur during parturition has already been described under "General Remarks in Anomalies of the Pelvis." All that applies to obstruction in delivery there is applicable also here. When the obstruction which blocks the pelvic entry cannot be removed, as in contracted pelvis, tumours, stenoses, hydrocephalus, and oblique positions of the child, and the pains are strong and increasing and the liquor amnii has escaped prematurely, there is always the danger of laceration of the lower uterine segment. The treatment embraces:

1. The removal of the obstruction. This may be effected by Walcher's "hanging posture," or by symphysiotomy; or if an ovarian cyst is the cause of the obstruction it may be punctured; a fibroid may be pushed upwards into the abdomen or removed. The presentation of the foetus may be improved, version may be performed, a hydrocephalic head may be punctured, or the cervix may be dilated by a hydrostatic dilator.

2. Prevention of laceration by recognizing the approaching danger by the appearance of Bandl's contraction ring. When this appears version must on no account be attempted, and the patient must be cautioned against straining. She should be anaesthetised and labour should then be terminated at once by perforation, decapitation, or Caesarian section.

3. Prevention of the serious consequences of laceration. Most dangerous of all are the complete ruptures which at the same time open into the vaginal vault and the transverse ruptures of the body of the uterus, because in both these cases germs which have got into the vagina by explorations and by operations may pass direct into the abdominal cavity. If far from a hospital it is best even today in complete rupture of the uterus to deliver the child through the natural passages, even when it has passed through into the abdominal cavity, and afterwards to plug with iodoform gauze. Lacerations which bleed much should be stitched up. When there is extensive laceration and undermining of the broad ligaments the uterus must be removed to prevent infection, for which the necrosed tissues and the blood clots afford a favourable soil in cavities of the connective tissue.

In these cases, as indeed in obstetric practice generally, frequent examinations and futile operative procedures should be avoided: if a laceration occurs after such interference the prognosis is certainly very much worse.

The prognosis is much better when the laceration, even if complete, is caused by abrasion of the tissues, because a circumscribed adhesive peritonitis will at once close it. Genito-urinary fistulae are very fatal. Those occurrences may be prevented in generally contracted pelves and in the so-called "spinous pelvis," if the head is not permitted to remain fixed and stationary for too long a time when the pains are strong: the head should be carefully levered with the forceps, which should not be put on while the os uteri is insufficiently dilated.

4. PREVENTIVE TREATMENT FOR LACERATIONS OF THE GENITAL CANAL—CERVIX, VAGINA, PERINEUM

The usual laceration of the os uteri helps delivery and may almost be regarded as a physiological event, and may even be imitated with advantage by making small incisions. Deep lacerations of the cervix are mechanically produced in most cases by the too early use of forceps. If it is necessary to apply forceps early, the necessary space should first be made by crucial incisions through the lips of the os uteri, avoiding the commissures of the lips. In this way laceration is prevented, or if laceration should take place its direction has been determined by the incision and the uterine vessels which lie laterally will be avoided. The lacerations must be carefully stitched up to prevent loss of blood and infection. For stenosis, atresia and cancer as causes of lacerations of the cervix, reference should be made to those sections.

Lacerations of the vaginal vault are extremely serious, because the connective tissue of the broad ligaments may be extensively undermined even as far as the peritoneum which may be torn. Some of these lacerations are the result of mechanical violence; others are caused, like the ruptures of the lower uterine segment, by too great a tension of the vaginal vault when the uterine contractions are tonic in character or expend their force in an unfavourable direction, for example when the abdomen is pendulous or when the patient is standing up and bending too far forward. Others again are caused by primary rigidity and inelasticity of the tissues. By careful watching many of the lacerations may be prevented; in some it is however impossible to foresee and to prevent the laceration, and this applies especially to exhausted women who have borne many children. The symptoms of the laceration may not be at all conspicuous at first, but when the laceration has occurred delivery should be completed as soon as possible, otherwise internal haemorrhage may follow. If the injury is not very extensive the laceration should be stitched,

but if very severe the uterus will have to be removed, or at least plugged with iodoform gauze.

Lacerations in the middle of the vagina are longitudinal, generally the result of violence and brought about by the too hasty introduction of forceps or too early raising of the handles of the forceps. They should be at once sutured: they often cause vesico-vaginal fistulae, but rarely recto-vaginal fistulae.

Lacerations at the vulval orifice and of the perineum may be produced by very rapid passage of the head, by a large and hard head when the perineum is rigid and inelastic, by passage of the occiput over the perineum in brow and in face presentations, by wrong posture of the patient at the moment of birth, such as sitting up. When the child's shoulders are very broad laceration may be caused by the passage of the posterior shoulder if the child's head is allowed to fall backwards, or if traction is made. It is also produced by raising the handles of the forceps too quickly. Many lacerations are therefore avoidable. Appropriate preventive treatment consists in protection of the perineum, and occasionally lateral incisions in the perineum may be required. The latter are only needed when there is danger of laceration of the whole perineum (complete laceration of the third degree), or when it is desirable to hasten the birth of the child; such incisions heal less well than lacerations of moderate severity. In suturing these deep incisions which are midway between the anus and tuber ischii, it is very important to fit accurately together the surfaces of the divided levator ani muscles.

Protection of the perineum consists in relieving the perineum from excessive tension; the right thumb and index finger placed outside the labia draw together the tense skin, while the thenar eminence lies against the perineum and presses the head forward towards the symphysis and keeps it fixed there. During a pain the head is held back by the left hand till the anterior fontanelle is born. After this straining efforts should be forbidden during a pain; the patient should be urged to

strain in the intervals between the pains, and the perineum should be turned back at the same time so that the face may be born. In delayed birth of the head it is useful to express the head and protect the perineum by the Ritgen-Fehling method, that is by manipulation from the sacrum and perineum (posterior perineal method), or by the Smellie-Ritgen method, that is by manipulation from the rectum. The best posture for the patient at this moment is the dorsal with the knees raised or the lateral position with the knees drawn up.

The birth of the shoulders also requires care. The head should first be lowered to allow the anterior shoulder to appear, and be fixed behind the symphysis. Then, while the perineum is protected, the posterior shoulder should be guided over the perineum and pressed towards the symphysis, the head at the same time being raised. This procedure may be aided by grasping the axilla. When the shoulders are too large absolutely, division of a clavicle is indicated to make it possible for the shoulders to fall together.

When the head has been born by forceps as far as the large fontanelle, it is best, especially in primiparae or when the perineum is rigid, to remove the blades of the forceps while the four fingers support the perineum and the thumb holds back the head. Afterwards the head should be expressed.

When laceration of the perineum has occurred it should at once be sutured to prevent both immediate and remote sequelae. The latter have been described in the section on Gynaecology, under "Prolapse" and "Plastic Perineal Operations." The patient should be kept in bed rather longer, because of the granulating tissues and the ease with which the wound is apt to ulcerate and thus extend further. The most dangerous lacerations are the complete lacerations, because faeces may reach the vagina. The parts should be sutured after the expulsion of the placenta, otherwise primary union may fail, but not later than six hours after delivery; secondary suturing generally fails.

To suture a complete laceration the following method is adopted. The entire surface of the wound up to the re-

motest angle in the vagina should be exposed. The wound has the shape of a butterfly, the thinner middle part corresponds to the deepest part of the laceration in the vagina, and the two wings correspond with the lateral walls formed by the rent in the larger mass of the perineal body. Commencing at the deep angle of the rent in the vagina, catgut sutures should be inserted to unite the rectal mucous membrane, in such a way that the sutures may include sufficient connective tissue and the ends of the sutures come to lie in the lumen of the rectum. The bowel should previously have been thoroughly emptied by an enema and the rectum should have been washed out. Then similarly the vaginal rent should be sutured, the sutures passing deeply into the recto-vaginal septum and being tied inside the vagina; catgut or silk or celluloid thread may be used. These sutures should only reach to the place occupied by the former frenulum perinaei, because the sutures of the perineum itself must be entered in another direction, commencing from the anus, in order that the correct form of the perineum may be restored. These sutures may be of silver wire, silkworm, or celluloid thread. The ligatures must lie at right angles to the perineum and be entered therefore perpendicularly to the surface of the perineum. Fine superficial sutures may be added to remove any irregularity or gaping of the edges of the wound and at the sphincter ani and frenulum perinei. The weakest spot is at the deep angle in the vagina where the recto-vaginal septum is very thin. Here the sutures must be so placed that the vaginal sutures do not touch the rectal sutures; and they must not be too tight, so as to avoid injury to and death of the tissues.

The after treatment is most important, because the chances of perfect union are reduced by the fact that the patients in whom lacerations occur are generally those who have little power of resistance. The strictest cleanliness, a trustworthy trained nurse and obedience on the part of the patient are further conditions required. As to the nurse I would particularly emphasize this point, because it happened to me once, when the relatives preferred

to choose their own nurse, that instead of giving the castor oil prescribed, the nurse gave an oil enema either from misunderstanding or because she thought it was better, and in a few hours the patient, who before was doing very well, suffered from endometritis which, in spite of all that could be done, led to parametritis on both sides which lasted for months: the nozzle of the syringe had perforated the sutured recto-vaginal septum.

It is best for this reason to make an easy passage for flatus by inserting a drainage tube covered with iodoform gauze or a Simon's urethral speculum. Evacuation of the bowels should be prevented for five days by tincture of opium; and liquid diet should be given for a week. The line of suture itself should not be touched, but lotion may be frequently run over the surface, and it may be dusted with airol or dermatol, or smeared with airol paste, which melts at the temperature of the body. The vaginal sutures should not be touched.

All this holds good, *mutatis mutandis*, for lacerations of the perineum of the first and second degrees, which extend at furthest only to the sphincter ani. It must be emphasized that often when the perineum seems intact externally there may yet be a deep perineal laceration when a vaginal laceration in the fossa navicularis has extended into the perineal body. The results of these are similar to those of laceration of the first and second degree, and the lacerations should therefore be carefully sutured.

5. PREVENTIVE TREATMENT FOR DIFFICULTIES ARISING FROM ANOMALIES OF POSITION AND OF FORM OF THE GENITAL ORGANS

Difficulties arising from faulty development of the genital organs may be the result of weakness of the muscular tissue, such as lacerations, protracted labour, and post partum haemorrhages, or they may be the result of the expulsive contractions of the uterus acting in a wrong direction, obliquely to the pelvic brim as in face presentations, obliquity

of the uterus, pelvic presentations and transverse presentations. Sometimes in uterus bicornis the second and empty uterine cornu becomes incarcerated like a tumour under the promontory: it should be early pushed away from under the promontory or possibly be removed. These difficulties may when they first appear be removed by correct postural treatment or by some obstetric procedure, after dilating with a hydrostatic dilator, and the threatened dangers may thus be prevented.

The troubles arising from anteflexion and lateral flexion of the uterus are generally those of laxity of the abdominal walls and lead to faulty presentation when the advancing part enters the pelvic brim, as in obliquity of the head, face and brow presentations and transverse presentations. They produce also lateral flexion of the trunk of the child.

Preventive treatment consists in keeping the uterus in position by a binder, in placing the patient on the corresponding side so that the presenting part may be brought over the inlet of the pelvis, in supporting the uterus by cushions, in pressing the occiput into the pelvic brim, in internal manual correction of an unfavourable presentation and version. By these measures the head may be made to enter the brim and become fixed or a foot presentation may be obtained.

With retroflexion when birth is at term we need to consider only the partial bulging or pouches produced, the remainder of the body of the uterus is generally anteflexed. Many causes may lead to this: for example adhesions after parametritis, adhesions after hysteropexies making it impossible for the anterior uterine wall to expand in pregnancy. Other causes are subserous fibroids and ovarian cysts, or the foetal head may remain below the promontory in incarceration of the gravid retroflexed uterus after the trunk of the child has risen out of the pelvis, and lastly with pendulous abdomen it may be caused by the faulty direction in which the uterine forces act.

The head is thereby pushed aside from its normal median position over the pelvic brim, and is pressed into the dis-

tended lower uterine segment. Laceration may occur or delivery may become impossible.

The object of preventive treatment first of all should be to remove the primary cause, and when this is impossible we must endeavour to correct the abnormal position of the head. For the latter it generally becomes necessary to bring the whole cervical canal into the axis of the pelvis: this can be accomplished by a hydrostatic dilator, which at the same time serves to dilate the cervix. If this fails an incision must be made through the anterior wall of the cervix. The same treatment must be followed if rupture of the uterus threatens. If a tumour is present and attempts to push it out of the pelvis have failed, we should wait to see what effect the labour pains will have. A cyst should be punctured or incised from the vagina.

Many obstructions situated in the genital canal may be removed during pregnancy or shortly before delivery or during labour itself. Among these are stenoses and septa of the vagina which may be congenital or acquired. Cicatrices of the cervix occurring after extensive operations and obliteration of the external os in primiparae may also be dealt with. Cystocele due to prolapse of the vagina, perhaps complicated by the presence of a vesical calculus in the cystocele, and lastly subcutaneous haematomata and other vaginal tumours may also need treatment.

Simple septa and stenoses of the vagina should be divided and bleeding points ligatured, or they may be forcibly stretched or incised. If a considerable degree of atresia exists a new vaginal passage may be made, by several operations, but it will later again become constricted. It would however be difficult to deliver a living child through the passage, and in some cases Caesarian section is unavoidable. To prevent haemorrhage when there is a haematoma, especially in twin pregnancies, the child must be quickly extracted, the haematoma incised, the bleeding points ligatured and the cavity plugged.

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6. PREVENTIVE TREATMENT FOR DIFFICULTIES ARISING FROM TUMOURS OF THE GENITAL ORGANS

The measures to be taken against complications during pregnancy and at the onset of premature labour have already been described above; there are other measures which have reference to delivery at term.

The consequences resulting from large intramural and from cervical myomata are similar to those which follow contracted pelves. The preventive treatment at the onset of labour at term is the same as that for contracted pelvis, the various degrees of contraction have the same relative effect, and prolapse of the umbilical cord or of the extremities is apt to occur.

Submucous myomata of the cervix often become enucleated and expelled. Preventive treatment should aim at assisting this natural process, and at preventing infection of the site of the tumour.

Subserous fibroids situated higher up are often raised out of the pelvis by the labour pains, though all attempts to push them up had failed. But if this does not occur and the tumour cannot be removed then Caesarian section becomes necessary and should be followed by removal or total extirpation to prevent the sepsis which is so apt to occur.

Even after spontaneous delivery it is often advisable to carry out this radical operative procedure, because the bruised tumour so readily leads to severe post partum haemorrhage, to retention of the placenta, or to suppuration.

Through the lack of room in the pelvis faulty attachment of the ovum often exists as a complication, producing placenta praevia or extra-uterine gestation, and these must also be considered in treating the case.

Among ovarian tumours the most dangerous are the fibrous tumours when they become wedged in under the promontory; but in all ovarian tumours there are the dangers of septic infection after bruising of the tumour, or avulsion of the tumour, or twisting of the pedicle when the tumour is pulled up into the abdominal cavity. Accord-

ing to the degree of narrowing of the pelvis lacerations of the uterus or vagina may also occur.

These dangers can be prevented either by pushing the tumour out of the pelvis, or by reducing it in size, or by removing it, or finally by Caesarian section and subsequent removal of the tumour.

When the cervix is infiltrated by carcinomatous growth laceration is apt to occur, because the vaginal part cannot be dilated. If it is impossible to make a passage by deep incisions or by an incision through the anterior wall of the cervix, the only alternative which remains is Caesarian section and subsequent removal of the body of the uterus from above and of the cervix from the vagina in order to avoid peritonitis.

7. PREVENTIVE TREATMENT FOR DIFFICULTIES IN LABOUR CAUSED BY ABNORMAL PRESENTATIONS AND POSTURES OF THE CHILD.

In each case we must determine exactly whether the faulty position of the child is a primary condition or, as is more common, a secondary condition. We shall then be able to select the method to remove the obstruction, and the method for secondary forms is often very different from that required to remove the primary anomalies of position.

(a) *Preventive treatment of complications in normal presentations.*

In occipito-anterior presentations there will, under favourable circumstances, be only two conditions which may arise and require treatment. The head may be low and yet advance slowly: the cause of this may be that the cord is twisted several times round the neck and thus may endanger the child's life. This condition would be probably present if the heart sounds are persistently below 100 or over 160, if there is umbilical souffle, the uterus painful, and the head does not press upon the examining finger or upon the perineum though the labour pains are strong; the head is also prevented from rotating forwards, and sometimes the cord may be felt round the neck by a finger in the rectum covered with an indiarubber finger stall. For such a case immediate extraction by forceps is indicated.

Further, the perineum may require to be protected during the passage through the vulval orifice. It should be borne in mind too that in the second vertex presentation the head may very readily become transverse, or may become an occipito-posterior presentation by rotation of the occiput backwards. This backward rotation may be prevented by placing the patient on her right side or by bringing the occiput to the front by means of the right blade of the forceps.

Occipito-posterior presentations are favourable when the chin is close to the chest, but the perineum is endangered by the passage over it of the occiput.

This is the case also, and even to a greater degree, in face presentations with the chin to the front. If there is great pelvic contraction, or the child is very large and the skull hard, the risk of bruising of the maternal soft parts and the formation of urogenital fistulae is great. There is danger too for the child through the excessive stretching of the cervical spinal column and spinal cord, and also from cerebral apoplexy as the result of pressure on the jugular veins.

The best treatment is to convert it into an occipito-anterior presentation while the head is still movable, or later by timely extraction with forceps when, in spite of strong labour pains, no progress is noted. When examining care must be taken not to injure an eye.

Among the causes which lead to face presentations are pendulous abdomen and contracted pelvis, and to prevent a presentation from becoming a face presentation the uterus should be held back by a binder, the patient should be placed on her side (the side corresponding with the child's occiput), and the uterus should be supported and the occiput pressed into the pelvic brim. If the tendency of the head to take up an abnormal position persists version should be performed as a preventive measure.

Pelvic presentations are often dangerous for the child, because after the birth of the breech attempts at respiration are made by the unborn head directly the cord becomes pressed upon, and prolapse of the cord is apt to occur. This sign and enfeeblement of the heart sounds after a pain are

indications for extraction of the child, and the further precautionary measures already described under "Extraction" must be adopted.

When we remember the causes which produce pelvic presentations it becomes evident that interference to alter the presentation is not required. When the child is small and premature a pelvic presentation adds no danger to delivery; so too when the foetus is malformed or macerated. In twin pregnancies one child has very often a pelvic presentation: here too interference is not required; on the contrary it may be necessary to perform podalic version with the second child. And when a uterus, through laxity of its walls or through over-distension, tends to cause a pelvic presentation, here too this presentation is best, because when the head is the advancing part it is apt to be forced into a recess in the lax lower uterine segment, so that the cervix does not become dilated, and podalic version would eventually become necessary. And even when the breech presents it may become necessary to bring down a foot for the same reason, or because the breech does not enter a contracted pelvis. It may also be required when there is prolapse of the cord or placenta praevia and the breech is still movable, in order to save the child and not expose the mother to further dangers.

(b) *Preventive treatment for cases where pathological forms of pelvis or other typical causes have produced presentations which are favourable in those forms of pelvis or not unfavourable.*

When describing the prophylactic measures required for contracted pelves it was stated that obliquity in vertex presentations was favourable in a flattened pelvis, and that excessive descent of the occiput was desirable in generally contracted and certain oblique pelves. Such presentations I include in this group.

When the sagittal suture enters in the oblique diameter, or even in the conjugate of the brim, nothing should be done to change the position, especially when the cause of it is a generally contracted or a lumbo-sacral kyphotic pelvis. Under ordinary circumstances the head will turn into the

transverse diameter at the brim if the pains are strong and the patient lies on the side towards which the occiput ought to turn.

Presentation of the anterior parietal bone or Naegele's obliquity is the most favourable presentation in flattened pelves, and it should not be interfered with unless the deviation is extreme and the sagittal suture remains stationary, and there is a tendency towards an ear presentation, or unless some other serious symptom appears, such as distension of the lower uterine segment. If the coexisting lateral flexion of the child's body is too great because of a pendulous abdomen, the uterus should be supported and held up by the various methods already described. Naegele's obliquity, which often occurs at the onset of labour under normal conditions, is of no significance.

Presentation of the posterior parietal bone, or Litzmann's obliquity, is much less favourable than the former, and when there is much pelvic contraction leads to very great difficulties. The case should be very carefully watched, and interference will be required according to the table drawn up for general preventive treatment in abnormalities of the pelvis. Two additional points have to be considered: which kind of pelvis is present? and does the occiput or the forehead descend most under the influence of the pains? The latter is the less favourable presentation, and becomes the worse according to the degree of general contraction of the pelvis which is combined with the flattened pelvis. On the other hand a combination of presentation of the occipital bone and of the posterior parietal bone affords relatively the best prognosis for generally-contracted pelves, and should therefore be encouraged as a preventive measure by suitable posture of the patient and by pressing the occiput into the pelvic brim.

Descent of the large fontanelle in occipital presentations and in obliquities of the head is favourable in flattened pelves and unfavourable in generally-contracted pelves. In the latter the presentation should be corrected by internal and external manipulation and by placing the patient on the side corresponding to the occiput.

Presentation of the occiput, or Roederer's obliquity, is favourable for a generally-contracted pelvis and for a flattened generally-contracted pelvis when combined with Litzmann's obliquity. If the contraction is great impaction readily occurs. For this see "Generally-contracted Pelves."

A transverse position of the head low down in the pelvis is not seldom the consequence of obliquities, as it occurs in fronto-anterior presentations, where rotation forwards of the occiput commences in the interspinous line but is not completed, and in prolapse of the anterior arm, in inefficient labour pains with fronto-anterior presentations, in funnel shaped pelves and when the pelvis is too wide or the head too small.

If then the presenting part of the vertex is already near the interspinous line and there is no rotation forwards of the occiput we must prevent the head from remaining in this transverse position, because spontaneous delivery would be very difficult. According to the cause we must either place the patient on the side corresponding with the occiput (more rarely on the side corresponding with the forehead, when the presentation was originally fronto-anterior), or else rotate forwards the small fontanelle (or in certain cases the large fontanelle) by hand or by the posterior blade of the forceps. In "spontaneous evolution" and in delivering "conduplicato corpore" of small embryos in transverse presentations, we merely assist this process of delivery, because immature and macerated embryos can be delivered spontaneously in this way. Traction on the advancing limb will help.

(c) *Preventive treatment for positions and presentations which in themselves produce difficulties.*

Fronto-anterior presentations with descent of the forehead and extension of the head occurs when the resistance is abnormal. To prevent descent of the forehead the patient should be placed on her side, the side corresponding with the foetal occiput, and an attempt may be made to hold back the forehead by internal manipulation. If this fail and the brow becomes fixed on the horizontal ramus of the pubis, the head should be extracted with forceps, in order

to prevent further danger to mother and child. This is in reality a preventive measure, seeing that the brow must first be pushed up from its fixed position on the pelvic ramus and rotated into the transverse diameter and afterwards extracted. If the child is dead it is better for the mother's sake to perforate and extract with craniotomy forceps.

Brow and face presentations are aetiologically closely related; in the former the prognosis is generally bad; in the latter, when the chin remains posterior, the prognosis is invariably bad. It is therefore urgent that these presentations should be prevented or should be converted into more favourable ones. These unfavourable presentations may be produced by abnormal resistance and by functional abnormalities. On the part of the mother they may arise from the pelvis, from the soft parts, or from the nature of the labour pains, and from incorrect posture or restlessness. On the side of the embryo, they may arise from too great or too little rigidity, from faulty position through prolapse of an arm, from twins, from hydramnios, or from placenta praevia. A short umbilical cord twisted round the neck, or incorrect operative interference, such as traction with forceps in the wrong direction, may also give rise to them.

All the above named causes must be met and treated according to the rules already given. When the brow or face begins to come down, or when these presentations already exist and the head is still movable, they should be converted into occipital presentations bimanually by the combined action of external and internal manipulations. Should this method fail, or if we anticipate danger either immediately or later from a vertex presentation, podalic version should be performed as a prophylactic measure. But even when the head is already low in the pelvic, brow presentations and mento-posterior face presentations can still be manually converted into mento-anterior face presentations. These are however more difficult to correct than when the head is movable, and if the attempt is not successful we have then only to consider the safety of the mother. No attempt should generally be made with forceps,

because the mother is thereby exposed to serious injuries, and the child too—and a successful issue is more than doubtful from the very beginning.

Presentations of the anterior or posterior ear are unfavourable extreme results of presentations of the anterior or posterior parietal bones, and what was said under the latter applies still more here.

In pelvic presentations, the unfavourable are presentation of the foot, lateral lodgment of the breech, a catching of the after-coming head on the symphysis by the brow or chin, and fixation of the anterior arm in the nape of the neck behind the occiput.

When the breech has become lodged in the iliac fossa, and when there is incomplete presentation of the posterior foot, the anterior leg should be brought down. It should be borne in mind that the os uteri is incompletely dilated in foot presentations, and incision of the os may be needed. Above all, it is best to wait as long as possible before extracting, unless examination of the heart-sounds shows it to be necessary.

When abnormal rotation of the after-coming head has been diagnosed—that is when the occiput is posterior—and the breech is still movable, it is possible at once to act so as to prevent difficulties which would later arise. Thus, if in spite of good labour pains and dilatation of the os uteri rotation has not taken place, the anterior foot should be brought down. If the breech is fixed and high, a loop should be passed round the groin of the anterior thigh, and traction be made in a direction from the side towards the front. Should the breech be fixed but already low in the pelvis, rotation of the trunk is effected by the index finger in the groin with the help of the thumb and middle finger, while with the other hand upon the abdomen the head is brought into the transverse diameter and then is pressed through the brim of the pelvis by pressing on the forehead. If the head is already in the pelvis, it can be brought into the transverse diameter by the finger in the mouth and the occiput be rotated forwards. When this fails, with dead children, a blunt hook can be inserted in the canine fossa to

make traction. Then the finger being placed in the mouth and the shoulders grasped from behind, the occiput is guided over the perineum while the face is fixed against the pubic symphysis.

Extension of the arms, which makes it possible for the anterior arm to become fixed behind the head, can be avoided by extracting the child slowly and only during a pain; or the labour pains may be replaced by the strong pressure of two hands upon the fundus uteri.

The preventive treatment for oblique and transverse presentations (shoulder presentations) depends largely upon the causes which have produced them, and which may in brief be summed up as abnormally increased or diminished resistances during childbirth.

There may have been faulty posture or sudden violent movements on the part of the mother. The pelvic inlet may have been contracted. The uterus may have been too broad or its walls too lax, especially in multiparae, or the uterus may have been abnormal in shape or in position, as in anteflexion. The labour pains may have been anomalous. The ovum may have been in fault, as in placenta praevia, hydramnios, or premature rupture of the membranes. The child may have been too large or too small or hydrocephalic, or twins may have been present.

Many of these primary causes may be removed or rendered harmless during pregnancy and during labour by the methods already described.

If at the onset of labour an oblique position has been diagnosed, it is generally possible to restore the vertical position when the pains become stronger, if other circumstances are favourable. The patient should be placed in the lateral position, on the side towards which the child's head tends, and in this way we can help to convert it into a vertex presentation.

The oblique presentation may be corrected by external manipulation when the presenting part (shoulder) is not already fixed in the pelvis and the membranes are still intact; it may be done even when the os uteri is almost completely dilated.

When combined internal version is required, though only two or three fingers are employed in Braxton Hicks' method, it is preferable as a prophylactic measure to perform podalic rather than cephalic version, even in those cases where podalic version is not indicated so far as the primary cause of the oblique position is concerned.

When "spontaneous version" has taken place in the pelvis, or "spontaneous evolution" or "spontaneous expulsion," in the former two, the prognosis is good for the child in only one-seventh of all cases, and is doubtful as regards the mother; but in spontaneous expulsion the prognosis is bad for the child, and very serious as regards the mother. These cases may become "neglected transverse presentations," and the many serious consequences resulting from the protracted labour and the treatment of these has already been described under "Rupture of the Uterus" and "The General Treatment of Anomalies of the Pelvis." The primary condition for success is to keep the membranes intact as long as possible, and to retain the liquor amnii. Premature separation of the placenta is one of the dangers.

8. PREVENTIVE TREATMENT FOR DIFFICULTIES IN LABOUR CAUSED BY THE FOETUS

(*a*) *Twin pregnancies and multiple pregnancies.*

Pelvic presentations, oblique presentations, and the more unfavourable presentations are far more frequent in twin and in multiple pregnancies than in single pregnancies. Sometimes the second placenta is separated before the birth of the second child, and very rapid extraction can alone save the second child from asphyxia.

As a result of over-distension and atony of the uterus, post-partum haemorrhage is to be feared; ergot should be given as a preventive measure shortly before the expulsion of the second child, and the uterus must be carefully watched. The placental end of the umbilical cord of the firstborn child should always be ligatured to prevent loss of blood by the second child through placental anastomoses.

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(*b*) *Malformations.*

Difficulties seldom arise because a foetus is premature or poorly developed. Difficulties, even rupture of the uterus, may arise most frequently from hydrocephalus and from distension of the abdomen of the foetus by hydronephrosis or ascites. These are often combined with hydramnios. Pelvic presentations are very common. In a fourth of all cases spontaneous delivery occurs by the hydrocephalic head being squeezed through with a vertex presentation. This should be promoted, and puncture of the vertex is most rational. For the same reason, diminution in size of the abdomen of a foetus which in any case cannot live, can be effected by means of Siebold's scissors.

The results of the delivery of excessively large foetuses, or those with much ossified skulls or abnormally broad shoulders are very serious. One should not wait too long. To deliver the shoulders, division of one clavicle is recommended.

9. PREVENTIVE TREATMENT FOR DIFFICULTIES ARISING FROM THE UMBILICAL CORD OR MEMBRANES

Prolapse of the cord greatly endangers the life of the child, and attempts should be made to replace it even when the os uteri is insufficiently dilated. It is safest to perform podalic version either immediately, according to Braxton Hicks' method, or after complete dilatation of the os uteri by a hydrostatic dilator which serves to dilate the os and at the same time to hold back the umbilical cord. Under "Preventive Treatment in Occipital Presentations" I have already referred to twisting of the cord round the neck.

Intra-uterine placental haemorrhage may be caused by many conditions. Placenta praevia or insertio velamentosa may give rise to it, or it may result from premature separation of the placenta or its partial adhesion, by its retention, or by atony of the site from which it has come.

In insertio velamentosa we must guard against injuring any vessel on the membrane when the membranes are artificially ruptured, and we must in most cases attempt to

keep the bag of membranes entire till the os uteri is completely dilated, and then immediately proceed with the extraction of the foetus.

Premature separation of the placenta may arise from nephritis, eclampsia, infective diseases, from all causes which produce abortion, from trauma, too long delayed rupture of tough membranes, and from excessive labour pains. These are for the most part causes which can be successfully removed if diagnosed in time. If the placenta has become prematurely detached, the mother runs great danger from haemorrhage and the child's life is certainly lost. For these reasons delivery should be immediately brought about.

Post-partum haemorrhage through atony of the uterus may be the consequence of inflammatory processes, of which the fibrous adhesion of the placenta is a sign, or it may be the result of disturbances in innervation, especially after an exhausting labour, or over-distension in pregnancy, or after precipitate labour. In multiple myomata of the uterus it is impossible for the uterine wall to contract evenly.

In the last two groups the atony is known to exist, and ergot should be given as a preventive measure shortly before the expulsion of the child's head. The placenta should then not be expressed too early, unless there is some special indication for it, but we should rather wait for a few hours. When expressing the placenta by Crédé's method the fundus uteri must be firmly contracted, otherwise inversion of the uterus is apt to occur, as it would if the cord were pulled upon. If after expulsion of the placenta the uterus disappears from beneath the fingers and kneading of the soft walls of the uterus does not restore it, the uterus must be massaged bimanually; or lastly, the vaginal portion of the cervix must be drawn down to the vulva by vulsellum forceps.

When part of the placenta is retained or the placenta is adherent by one edge, it must be removed by hand to prevent haemorrhage, decomposition and sepsis. The strictest asepsis and the greatest care must be observed lest

a fatal injury or infection should be caused. The uterus must be firm, so that the remains of the placenta can be distinguished from the uterine wall. After the operation ergot should be administered and the uterus should be irrigated with a hot antiseptic solution such as a 1 or 2 per cent. solution of lysol, but corrosive sublimate must *not* be used. In every case of post-partum haemorrhage the possibility of lacerations of the cervix or vagina should be borne in mind, should be looked for through a speculum, and be sutured.

10. PREVENTIVE TREATMENT FOR ANOMALIES IN THE LABOUR PAINS

We have already repeatedly emphasized the importance of regulating the labour pains as a preventive measure. Excessive labour pains lead to precipitate birth when the resistance offered by the maternal parts is slight, as in multiparae. Heredity or too short an umbilical cord may also play a part in bringing about precipitate labour. Prophylactic treatment will prevent harm occurring. The patient should early assume the recumbent posture, lying on her side, and should not make any bearing down efforts. The perineum must be supported early.

Labour pains which are progressively stronger and stronger and yet cannot overcome the obstruction lead to tumultuous pains, and finally to tetanic contraction of the uterus. These pains cause no advance of the foetus, but seriously predispose the uterus to rupture. Further, they give rise to premature separation of the placenta and to danger of death of the mother from haemorrhage; and lastly, this, combined with the interruption of the placental circulation by the long continued uterine contractions, may cause death of the child. Unsuitable and therefore unsuccessful attempts at delivery and the administration of large doses of ergot during the first stage must be altogether avoided.

An anaesthetic should be given to moderate the labour pains, and delivery should be completed under anaesthesia, generally by reducing the size of the foetus. It should be

remembered that prolonged narcosis is injurious, as it increases the danger of infection in women who are already exhausted, and often does not remove the spasm of the uterus. Version is always contra-indicated in such cases of neglected transverse presentations.

Spasmodic strictures of the uterus are rare in labour. Cases which are often regarded as such represent local uterine contractions which do not effectively dilate the cervix. Spasmodic strictures may however be observed in the third stage of labour, and lead to retention of the placenta and haemorrhage; one edge of the placenta is found to be presenting at the os uteri. Preventive treatment consists in great caution in the use of ergot; sometimes indeed it regulates the labour pains and brings about a separation of the rest of the placenta, but it may also increase the spasm by which the placenta has become constricted. Great caution must be observed also with narcotics, because of post partum haemorrhage. Premature attempts at expression of the placenta after the expulsion of the child readily call forth such conditions; no advantage is ever gained by such haste. If there is no haemorrhage we may wait for hours, or even half a day, applying hot compresses, promoting diaphoresis, and endeavouring to procure sleep for the patient, who should of course be watched. The placenta may then be expressed by Crédé's method, or if this fails must be extracted by hand.

Partial spasmodic labour pains occur frequently in nervous chlorotic patients. They are ineffectual because they do not perfectly direct the long axis of the child towards the internal os uteri, because they drive the head into a recess of the lower uterine segment when the latter is lax, and because later their painfulness prevents the proper use of bearing down efforts. The primary causes may be chronic inflammations or disturbances in innervation; or when there is hyperaesthesia of the vaginal vault or of the cervix, they may be caused by digital examination. In such patients an internal examination should therefore be made only when there is urgent necessity for it.

The labour pains should be regulated and their effects

controlled by narcotics, or by baths, hot compresses, or a mustard leaf.

The author regards the promoting of diaphoresis as an excellent method of regulating the pains. If it does not succeed podalic version may be required when, after dilatation by a hydrostatic dilator, the head does not present.

True weakness of the labour pains, which is not produced by tetanic uterine spasm, is seldom met with. It may be produced by many different causes, which should be known in order that they may be successfully overcome by preventive treatment. The danger begins with the early rupture of the membranes, which allows the uterine cavity to become invaded by cocci, and causes death of the child through the prolonged labour. This however is true only for certain forms of weakness of the labour pains, which may be grouped together as secondary causes. The primary causes are the previous over-distension of the uterus by hydramnios and twins, the exhaustion of the uterus by a protracted labour or haemorrhage, chronic inflammations, adhesions of the uterus to other structures, and faulty inclination of the uterus. Indirect weakness of labour pains is produced by inefficient action of the abdominal muscles, by an overfilled bladder or rectum, and by pelvic inflammations.

The knowledge of the causes enables us to remove or to reduce them to some extent; or if they are already acting, it leads us to shorten the labour as far as possible, and to take all due care, especially in the third stage of labour which should not be too actively treated. Ergot may sometimes be given as a preventive. Primary weakness of the labour pains may be due to general bodily weakness, or to weakness of the uterine walls when the uterus is ill developed or contains tumours. It occurs also from a want of contractility in older patients, which results from subinvolution. This weakness of the labour pains may be prevented by rest, by keeping the membranes unruptured as long as possible, and by rupturing them after the os uteri is completely dilated. The labour pains should be stimu-

lated by warm baths or by hot vaginal douches, at a temperature of 108° to 117° F. every one or two hours, using each time one or two gallons of sterilized ·8 per cent. saline solution, or a quarter per cent. solution of lysol. The fluid must be injected under a very low pressure. Hot compresses over the fundus of the uterus may also be employed, diaphoresis should be promoted, and stimulants, especially broth and tea, are useful. Narcotics must not be used till towards the end of the second stage of labour. Do not forget to empty the urinary bladder and rectum. If the uterus is over-distended rupture the membranes. In other cases hydrostatic dilators of the cervix and vagina may be employed. The various methods of expression and of extraction may have to be considered, and should be selected strictly in accordance with the indications. They should be slowly carried out in conjunction with the labour pains, and the simplest methods should be first tried. The third stage of labour must be treated in the way already described. A very rare consequence of relaxation of the cervix is acute inversion of the uterus, already referred to in the Gynaecological section. Therefore, pulling on the umbilical cord and expression of the placenta when the uterus is not firmly contracted, are strictly contra-indicated.

11. PREVENTIVE TREATMENT FOR DIFFICULTIES ARISING FROM DISEASE OF OTHER ORGANS

The most important of these are disease of the heart, disease of the lungs, such as pneumonia, influenza, and especially tuberculosis, chronic nephritis (with eclampsia) and erysipelas, which readily leads on to puerperal fever. When cardiac lesions are present, the heart action is injuriously affected by labour and by the circulatory changes accompanying it, especially in the abdominal region. This can be prevented by securing cardiac compensation during pregnancy. The membranes should be ruptured early, injections and inhalations of ether should be given during and after parturition, sand bags should be placed on the abdomen after delivery, and delivery may even be accelerated by a hydrostatic dilator and extraction, which

should be very slowly performed. Some haemorrhage post partum is not altogether unfavourable. Ergot is injurious. Oedema of the lungs readily sets in, both in pulmonary and in cardiac disease. With tuberculosis there is a rapid loss of strength by progress of the disease, and this is aggravated by severe haemorrhage. The latter should be prevented, and symptoms treated.

The preventive treatment of eclampsia has already been given. When the pulse is bad, narcotics, and especially chloroform, should be avoided as much as possible.

12. PREVENTIVE TREATMENT IN OBSTETRIC PROCEDURES

General prophylactic measures against puerperal infection are assumed to be known in every detail to the obstetric practitioner. There must be no contact with any septic person or thing. There must be the most minute mechanical and chemical purity, and for this purpose Mikulicz recommends the spiritus saponatus of the German Pharmacopoeia. No vaginal examinations, or as few as possible, should be made. No operative interferences should be undertaken except according to the indications. These are the principles. Antiseptics, at the head of which are cresol and lysol, must be very sparingly used in the genital canal. In private practice we need not as a routine principle carry out a vaginal antisepsis, nor yet under all circumstances refrain from using it. If required, as before and after operative interference, or versions, or when one is doubtful of the aseptic conditions of previous examinations, the physician himself should, at least once, give the antiseptic douche, and then entrust it to a trained and conscientious nurse. It is sometimes advisable first to inspect the irrigator tubes and nozzle and see how the nurse uses them. Under the preventive treatment of operative interference are included the most careful examination, and diagnosis of the presentation, and for this purpose the bladder and rectum should previously have been emptied.

Operations intended to improve the presentation, turn-

ing and the reposition of prolapsed parts, should not be undertaken when the lower uterine segment is tensely distended and the contraction ring is approaching the umbilicus. Further, they should not be undertaken when the head has passed the pelvic brim and is fixed in the pelvis. To prevent a threatened prolapse of a hand or foot or of the cord, the bag of membranes should be kept intact as long as possible, the patient be at once placed in the recumbent posture, on the side towards which the presenting part of the child has shifted, or lastly should assume the knee-elbow position. Early bearing down efforts should be forbidden. When the prolapsed part has been successfully replaced, the presenting head should be firmly pressed down into the pelvic brim so that the replaced part cannot descend.

These operative procedures may only be used to reinstate the vertex presentation when there is no immediate danger, and when presumably no further obstacle is present, otherwise by podalic version we make it possible to deliver at any moment when the os uteri is sufficiently dilated. The anterior foot should be used to turn, because the back of the child is thereby brought to the front, or remains in front. In oblique presentations the advancing foot should be brought down, and when the back of the child is directed posteriorly, the version should be completed by bringing down the upper foot, that is, after the lower foot has been brought down and left in the vagina to fix the child. The liquor amnii may be allowed to escape early, so that the head may become fixed after the version.

When it is desired to puncture the membranes, but to retain the liquor amnii if possible, the membranes should be perforated as high up as possible above the internal os uteri. The patient should afterwards lie still in the dorsal position. The membranes may similarly be punctured in the second stage of labour, when the membranes are very tough and the placental site is being pulled upon. Here too care must be taken not to injure any placental vessels on the membranes (insertio velamentosa), which might cause death of the child by loss of blood. Puncture of the

membranes is a preventive measure against the possibility of premature separation of the placenta and concealed haemorrhage.

In perforation the head must be fixed from above; for perforation of the after-coming head one selects the posterior temporal fontanelle. When applying the cranioclast, no maternal soft parts or foetal membranes should be included. If the sharp hook is used in the extraction, it must be well protected and firmly fixed so that it may not slip off and cause serious injury. In performing embryotomy never divide or grasp anything which cannot be well included within the two examining fingers and its nature diagnosed.

Delivery by expression is the operation which is least injurious and dangerous, because the internal genitalia are not interfered with. But Crédé's expression of the placenta must not be adopted too soon, not before expiration of half an hour after the birth of the child, and not during an interval between two pains, or it may cause inversion of the uterus.

In pelvic presentations the following points must be observed in the extraction of the child. The back of the child should be brought to the front, the traction must be slowly made, and not in the intervals between the pains; the mistake should not be made of trying to bring down the legs too soon. The head, the face being directed backward, should not be drawn into the cervical canal till the latter is sufficiently dilated. The umbilical cord should be put back when the child "rides" upon it. The arms must not be permitted to become extended by too rapid traction during the intervals between the pains, but pressure should also be made upon the fundus of the uterus externally. The arms should be brought down in a curve over the face and chest. The anterior arm should only be brought straight down when the elbow presents. Great care must be taken when extracting the head and protecting the perineum, because too strong a traction or levering may cause serious tension on the cervical muscles, and even lacerations of the vertebral column. The method

may be modified by placing the index and ring fingers over the shoulders of the child, the middle finger stretched towards the occiput, the other index finger and possibly also the middle finger is placed in the mouth, and the thumb outside against the lower jaw.

Forceps may only be applied, as was stated under "version," when the head is firmly fixed, the os uteri fully dilated, the membranes ruptured, and the child alive. The contraction of the pelvis must not be greater than indicated in the table given above, p. 365. Pressure upon the foetal skull and pendulum movements from above downwards are not permissible. When applying forceps, and with the first trial traction, we must be sure that no maternal soft parts or foetal membranes or parts of the child have been included, and that the head is following as traction is made, and is rotating correctly. Traction should be slow and steady, and should be made only during the pains. The forceps must be applied so that the concavity of their pelvic curve is directed forwards and turned towards the part presenting. If the head does not rotate sufficiently, the blades of the forceps should be removed and re-applied in the transverse or oblique diameter. The forceps should be removed before the head passes over the perineum, and the four fingers should protect the perineum while the thumb holds back the head. A lateral incision should be made if the vulval orifice is too small. Forceps are indicated for the after-coming head when manual traction to overcome the resistance would be dangerous for the child. They should never be used when the head is still high. In funnel shaped pelvis a transverse diameter of about three inches is the limit within which it is possible to extract by forceps.

Preventive treatment as regards surgical measures to bring about delivery consists essentially in their limitation both in frequency and in extent. They are in reality wounds and are exposed to contact with lochial discharge, especially in protracted and so-called "dry" labours, so that the conditions for healing are far more unfavourable than in gynaecological operations. During the first few months

after delivery and when the patient suckles her child, it is very difficult, and may be impossible, to persuade her to undergo an operation which will confine her to bed, and unless primary union has taken place, the defects remain until the appearance of other symptoms demands treatment. Lateral incisions into the perineum should be especially considered in this respect, the very limited indications for which I have already given under "Vertex Presentations"; they heal far less readily than perineal lacerations of the second degree. In suturing, the deeper parts of the opposed raw surfaces of the levator ani muscle must be closely approximated. In deep vagino-perineal incisions, haemorrhage is severe and must be stopped by clip forceps till delivery is completed. Healing of the wound is best aided by letting lotion run over it frequently, by sprinkling with airol, and by keeping it at rest. The choice of ligature is immaterial, but non-absorbent ligatures are preferable. The superficial crucial incisions of the os uteri should not be stitched, but if fever sets in they should be examined through the speculum, and if necessary be cauterized and irrigated with creosol or lysol solution under slight pressure. Deep incisions into the vaginal tissues must be sutured.

Preventive treatment in Caesarian section consists first in performing it at the right moment. Veit defines the right time as that when the genital canal is still aseptic, the bag of membranes entire, and when labour pains have already set in. Infection and post partum haemorrhage are thereby obviated. For the prevention of haemorrhage, a large dose of ergotin is given hypodermically after removal of the placenta, and ergot is again subsequently administered. The cavity of the uterus should be firmly plugged with iodoform gauze. To reduce as far as possible the loss of blood incisions through the fundus of the uterus (and they should be transverse according to Fritsch) are recommended, and in the anterior uterine wall, so that in case suppuration occurs in the wall of the uterus, it may be localized by the overlying omentum, or by adhesions with the adjacent peritoneum

and abdominal wall. Haemorrhage may further be checked by applying an elastic ligature around the lower uterine segment, or better still by the temporary compression of the uterine and ovarian vessels by an assistant. It has been suggested that a preliminary puncture and palpation should be made so that the subsequent incision may not involve the placental site. On the other hand, the quick performance of the operation seems more rational.

It is most important, as a preventive, that eight to ten silk or catgut sutures should be passed very exactly through the entire uterine wall but not including the endometrium. It is also useful afterwards to suture the uterine peritoneum by itself in a way similar to that in Lembert's suture of the intestine. Diaphoresis should be promoted after the operation: it serves not only to eliminate toxines but also to control the after pains. For this purpose, and at the same time to prevent vomiting, several enemata of saline solution should be administered. An ice bag should be placed upon the abdomen and later a wet compress.

The above holds good, *mutatis mutandis*, for Porro's supravaginal amputation of the uterus. The pedicle should be treated extraperitoneally at the lower angle of the abdominal incision; or should be covered with iodoform gauze, and so cut off as it were from the abdominal cavity: this method is preferred by the author. This gauze is brought down into the vagina. Gauze may be applied in this way too in complete rupture of the uterus. In osteomalachia this operation serves at the same time to prevent subsequent pregnancies.

Preventive treatment in symphysiotomy consists above all in avoiding the operation in private practice except in very rare cases, and it should never be performed in primiparae, in patients who are already infected, or in cases where the foetal membranes have ruptured prematurely. The foetal bag of membranes should be kept intact or be replaced by the action of a hydrostatic dilator. To prevent further separation or straining of joints, the

sides of the pelvis should be firmly held together by pressure on the trochanters, and the child should be extracted with the patient in Walcher's "hanging position." The pelvis should afterwards be held together by silver wire sutures and a firm pelvic belt.

Intra-uterine plugging with iodoform gauze should not be lightly nor often undertaken, as it is very liable to lead to infection. For uncontrollable post-partum haemorrhage due to inertia, bimanual massage of the uterus while held anteflexed should first be used, and the vaginal portion of the cervix may then be drawn down. If nevertheless the uterus fails to contract, plugging may then be resorted to—gauze soaked in cresol or lysol solution, or a ten to twenty per cent. solution of aluminium acetate is best; the latter has the property of stimulating contraction and acts as a haemostatic. We must also be cautious in the use of intra-uterine irrigation, for sudden abrupt elevations of temperature, collapse, and rigors with or without perimetritis or parametritis may often be observed after intra-uterine douching. Two or three irrigations are the maximum—corrosive sublimate should not be used—the fluid should be injected under very slight pressure, with a double tube so that the return current may flow easily. The canula should be inserted very carefully through a speculum so that no fresh lacerations may be produced. Air-bubbles must not be carried in with the fluid injected.

The application of steam to the interior of the uterus may be used in septic abortions, but not after labour, and the following precautions are recommended: one application only should be made lasting fifteen to thirty seconds, the temperature in the steam-vessel being 105° to 110° C., so that the entire endometrium may not be affected. The tube which is passed into the uterus must be prevented from coming into contact with the cervical wall by some bad conductor of heat, such as gauze, to prevent burning and atresia and subsequent haematometra. Before introducing the instrument, the length of the uterine cavity should have been accurately measured to prevent perforation of the uterine

wall. The catheter should be moved about and withdrawn a little so that the strong contraction which is excited may not bring the uterus too close to the instrument or allow of excessive action at one spot. The retained products of gestation should previously have been removed.

III. Preventive Treatment in the Puerperium

1. PREVENTIVE TREATMENT OF PUERPERAL FEVER

Preventive treatment consists essentially in avoiding unnecessary examinations and interference, but when these become necessary the strictest antisepsis should be observed in one's self and instruments, in the patient during labour and during the puerperium, and in her home and surroundings. Rubber gloves are recommended for very busy practitioners. Above all there should be no contact with septic things or septic people. Beds are not seldom the means for the conveyance of infection. Ulceration after lacerations and incisions is avoided by the methods described above. If a purulent discharge or gonorrhoea was present before labour, weak antiseptic douches under low pressure should be commenced at once; a one per cent. solution of lysol or metakresol may be used, but no corrosive sublimate.

In puerperal endometritis we must distinguish between microbic infection which is virulent and that which is relatively harmless. This is determined by the condition of the pulse, not by the temperature: the greater its tension, the smaller and the more frequent the pulse is, the more serious is the infection and the more cautiously must intra-uterine interference be employed, so that new channels of entry into the body may not be provided along the lymph and blood paths. Intra-uterine interference is indicated only when necrosed pieces of the placenta or membranes have to be removed, and the simplest method is the best. Curetting should not be attempted during the puerperium after full term delivery, even when decomposed products are present. The latter should be washed out, or removed by the finger when this can be done without

producing lacerations while dilating the cervix, or lastly may be cauterized with concentrated carbolic acid or formalin to prevent extension of the infection. It is important at the very commencement of the endometritis to take measures to limit the growth of microbes. This is best done by good drainage, thus carrying off the lochial discharge and necrosed portions of tissues, and for this purpose the vagina should be irrigated several times a day with a weak antiseptic, and the uterus should be stimulated to contract more strongly by placing an ice bag on the abdomen, or by wet compresses, and by the regular administration of ergot. The uterine contractions will expel the uterine contents, and will at the same time restore the normal position and anteflexion of the uterus. Pieces of membrane and retained products which have come down into the cervix may be removed by the finger or by polypus forceps; the vagina should be douched both before and after. The normal position and slight anteflexion of the uterus allow the lochial discharge to escape freely, while a lax walled uterus with sacculi, or a uterus which is abnormally anteflexed, leads to retention of lochial discharge, and to absorption of septic products giving rise to pyrexia. These conditions may be prevented—the latter by warm applications, or if there are violent colicky after-pains by hot fomentations, and even hot vaginal douches and enemata, the former by an ice bag and by narcotics per rectum. Ergot prevents the occurrence of both these conditions.

Preventive treatment for the other serious forms of puerperal fever consists in the early treatment of the morbid conditions already named, the ulcerations and endometritis and puerperal vaginitis. These serious forms of puerperal sepsis are metritis, parametritis and perimetritis, salpingitis and acute oöphoritis, lymphangitis and phlebitis of the uterus, and lastly general peritonitis, septicaemia and sapraemia.

The further extension of the infection is checked by the frequent use of ice, and when there is peritonitis by opium in small doses. The virulence of the microbes is lessened by the administration of mercury; the power of resistance

of the body is raised not only by stimulants but also by removing the poison from the body and eliminating the toxines by diaphoresis, frequent evacuation of the bowels, and above all by copious injections of normal saline solution, that is ·6 per cent., in the form of enemata or subcutaneously.

There is a wider field of treatment for the prevention of septic thrombosis of the uterine sinuses and pyaemia, and preventive treatment here is the more important seeing that we are almost powerless to cope with the disease when once it has appeared.

We should prevent the formation of large thrombi beginning at the placental site, and it is equally important to prevent post-partum and puerperal uterine haemorrhage. The causes of this haemorrhage should therefore be constantly borne in mind, namely—1. Defective uterine contraction after delivery, either from irregularity in contraction of the various parts of the uterus, as in marginal attachment of the placenta; in this case the haemorrhage is not very serious; or from paralysis of the placental site only, and this is accompanied by exceedingly dangerous haemorrhage. 2. The retention of products of conception produces haemorrhage generally during the first week only, but their decomposition causes the thrombi in the vessels to break down and so leads to secondary haemorrhage. 3. Slight recurring haemorrhages appearing after the first week are caused by subinvolution of the uterus, especially of the placental site. 4. This atony is often produced by endometritis, which also causes haemorrhage by giving rise to decomposition of thrombi and to inflammatory hyperaemia. 5. Haemorrhages are caused not only by congestion following relaxation of the blood vessels, but also by venous stasis, which gives rise also to thrombi. The venous stasis may be the result of anomalies in innervation, of the patient getting up too soon when there is a predisposition to subinvolution, of an overfilled bladder or rectum, of excessive straining at stool, of coughing or of work, and of disturbances of the circulation produced by flexion and displacement of a sacciform uterus.

Emotional disturbances and sudden attacks of fever aid these predisposing factors by giving rise to acute hyperaemia.

Decomposition of thrombi should, as already stated, be prevented by the immediate treatment of commencing puerperal endometritis.

If decomposition has set in, the breaking down of the thrombi and the formation of emboli is prevented by securing contraction of the uterus, by removing lochial discharges by means of antiseptic irrigation, and by absolute rest in bed. The patient must not be allowed to wash or dress herself, or to sit up for any purpose. Constipation and coughing must be prevented, and errors in diet must be avoided; a liquid nourishing diet is best. If nevertheless emboli form, symptomatic treatment is required. All that can be done in such cases to prevent the action of these injurious factors is comprised under the rules given for para- and perimetritis.

2. PREVENTIVE TREATMENT FOR RELAXED CONDITIONS OF THE PELVIC AND ABDOMINAL ORGANS

The puerperal period affords a good opportunity for restoring the lost tone of the striated and non-striated muscular fibres and of all the elastic and contractile elements of the abdominal walls, the intestines and generative organs and the ligaments of the pelvis. That the puerperal period alone is the cause of this loss of tone is not correct. The beginnings of that relaxed state are often evident even soon after puberty in neurasthenic girls who are predisposed to it and who are generally also chlorotic. Every subsequent severe strain or abdominal inflammation serves to aggravate the condition; pregnancy is one such strain, and the ligaments should be relieved by the use of a pessary up to the fourth month, and the abdominal wall should be specially treated after the fifth month. Even more important is the general treatment to raise the tone and strength of the body; this has been already given in detail in the section on Gynaecology. This must be pursued energetically and persistently in the puerperium. Unfortunately the greater

number of nurses have no knowledge of or wish to understand this treatment; at the most they merely heap a mass of linen upon the abdomen of the patient, which in some ways is useful but in others injurious. Many patients too regard all efforts in this direction as an unnecessary trouble, so that even when the physician is called in for advice in the puerperal period he preaches to deaf ears. He must suggest practical measures and he should see that these are carried out; and he will need to be very alert because the nurse will often disregard his instructions. It is best to gain the ear of the patients through their vanity, by pointing to the terrible size of the abdomen of friends whom they know. Soon after delivery a belt should be applied to the abdomen: it should be convex, reach to above the umbilicus and have five or six buckles and straps reaching down to the groin. Instead of this, long wide closely-woven cloths or towels may be used, and these may further be weighted. After the fifth day the abdomen should be massaged several times a day if there are no signs of inflammation. A regular action of the bowels should be secured. Flatulence should be treated by oil of peppermint or by enema. The bladder should also be regularly emptied. And, if there is no contra-indication, the patient should twice a day practise using the abdominal muscles by carefully raising herself in bed. For success it is most important too to establish an efficient lactation, and abdominal massage acts reflexly and favourably in this respect.

For subinvolution of the uterus ergot should be regularly administered. For descent of the uterus and prolapse of the vagina a pessary should be inserted, and later tampons of glycerine of tannin employed.

3. PREVENTIVE TREATMENT FOR DISORDERS IN THE PUERPERIUM ARISING FROM TUMOURS OF THE GENERATIVE ORGANS

Fibroids diminish in size in the puerperium, but very readily undergo nutritive and necrotic changes. Ovarian cysts increase in size and often undergo necrotic changes

through torsion of the pedicle or contusion. Such tumours and sometimes the entire uterus must be removed to prevent a fatal issue. Polypi should be at once removed for the same reason. The preventive treatment for disturbances in the puerperium, arising from general disease and disease of other organs than the genitals, has already been described. The chief diseases are erysipelas, pneumonia, influenza, phthisis, uncompensated cardiac lesions which readily lead to oedema of the lungs, neuritis, mental disorders, renal disease and diseases of metabolism. With regard to multiple neuritis it must be mentioned that this is generally the result of septic infection, sometimes through the use of too strong disinfectants, sometimes through bruising of the tissues during labour.

4. PREVENTIVE TREATMENT OF MASTITIS

The hygienic recommendations given under the heading of "General Preventive Measures," should be carried out. I consider it harmful to harden the nipples by rubbing with brandy; it is better to wash them daily with cold water, and to brace and improve the general constitution. On the other hand, extension of the inflammatory process must be prevented by looking for the fissure of the nipple and treating it with lead lotion compresses, or compresses soaked in a solution of aluminium acetate, which should be renewed every two to ten minutes, or lastly by an ice bag with a thin piece of flannel underneath it. To prevent fissures, glass shields with elastic nipples may be employed.

The Prevention of the Diseases of Children

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The Prevention of the Diseases of Children

The proper care and regulation of life, the avoidance of all injurious factors, the isolation of patients suffering from infectious disease, the strengthening of the body by suitable diet, by living in the fresh air of the country, of the mountains, or at the seaside, hardening the system by attention to clothing, and by care of the skin—these means to prevent the development or the spread of disease, have been employed nowhere so long and so thoroughly as in childhood. These were the guiding principles of the physicians of old, though their methods had not been confirmed by the results of bacteriological research. The relatively high stage reached in the treatment of the diseases of children, the branch of practical medicine now to be considered, makes it necessary that it shall be dealt with in this work in somewhat greater detail than the other subjects. I would, therefore, in these introductory remarks, ask the indulgence of the reader for the greater length of this part, which is necessitated by the circumstances of the case.

It will not be possible to treat the whole subject exhaustively; firstly, because the constant advance of scientific knowledge compels us to take an expectant attitude towards certain questions connected with preventive treatment; secondly, because this work is addressed mainly to the medical practitioner, and he does ask not for a compilation of the results of literary study, but for information derived from and based upon the author's own clinical experience, which may serve as a guide in his own practice. It is obvious that local circumstances and other external

conditions must impose certain limitations upon the individual experience of any one physician, but it seemed to me best to follow this personal method and sacrifice in some degree the completeness, and I proceed, therefore, to describe almost exclusively that which a clinical practice extending over 15 years has shown to be most valuable and beneficial.

Before describing the preventive treatment of the different groups of diseases, I will make a few general remarks. The several periods of child-life require each a different hygiene which comprises mostly those prophylactic measures which are best adapted to prevent the development of disease. In the new-born infant—using this term to denote the child during the period between birth and the complete healing of the umbilical wound which is the last sign of the previous physical connection with the mother—the chief aim must be perfect asepsis to prevent the introduction of germs into its body, for which there are so many opportunities, and to prevent germs which may have reached the skin or mucous membranes from becoming active and causing infection. In the second period—that period during which the child is or should be breast-fed—the chief dangers which threaten its life and health are digestive troubles, and these are best warded off by correct feeding. Other dangers, such as those arising from colds and from infection, are only of secondary importance. Early childhood—the period up to the commencement of the second dentition—is essentially the chief time for the various acute infectious diseases. The rapid growth of certain organs enables disease germs to effect an easy lodgment, the increasing independence of the child exposes it in a greater degree to the ill effects of bad weather, and games and other occupations afford many opportunities for acquiring disease. Here, the aim of preventive treatment must be to fortify the system against disease, to ensure the supervision of patients suffering from infectious disease, and to promote cleanliness in children's games and at meals. Late childhood—the period up to puberty—is still exposed, in part, to the dangers which threaten early childhood and to the additional risk of ill-effects which may result from school

education and mental work, and thus preventive treatment merges into the hygiene of education.

The whole subject may, therefore, be roughly divided into several groups, according to the age of the children, each group characterized by its own peculiar dangers to health. The possibilities of preventive treatment are not, however, confined to this. Often, especially in the chronic infections of syphilis and tuberculosis, the physician is obliged to enquire into the social life of the members of the family and give advice before conception has occurred. This branch of prophylactic treatment is, unfortunately, too little practised, in spite of its immense importance for entire generations, and it is partly also beyond the influence of the physician.

A further scope for preventive treatment lies in preventing complications from arising in disease in children. The task is not only to limit the actual number of infectious cases by isolation and disinfection, but also to check the infective process in the patient himself, and to protect him from germs which give rise to complications often far more dangerous than the primary disease. In this way preventive treatment may act most effectually and beneficially against the acute and chronic infective processes of child-life.

In these introductory remarks, I must not omit to mention one other matter, which I will term the prophylaxis of treatment; by this I mean caution in the use of certain methods of treatment to which children are very susceptible because of idiosyncrasies peculiar to childhood. Many mistakes have been and are still made in this—mistakes which are doubly serious because they also injure the physician and lower the good reputation of our profession. The subject will be treated according to the plan sketched out above, beginning with

PREVENTIVE TREATMENT IN THE NEW-BORN INFANT

Apart from those cases where the infective process reaches the fœtus by way of the placenta and causes premature expulsion of the fœtus, death of the fœtus, or infection of the child in utero, and which do not come within the scope

of our subject, there are others where the germs of disease enter the body of the unborn child through microbic contamination of the liquor amnii when the fœtal membranes have become prematurely ruptured. Such cases are very rare, and we are almost powerless to do anything against the disease—generally a septic pneumonia—caused by the contaminated liquor amnii. Infection may also take place during the passage of the child through the genital canal, when some infectious secretion from the mother's vagina penetrates into some cavity or recess in the child—the conjunctiva, the mouth, the vagina, or the rectum—or it may enter and become lodged in some wound of the child's skin, produced during parturition. The chief of these infections is purulent conjunctivitis of new-born children, which is partly gonorrhoeal and partly purulent. The great frequency formerly of this eye affection, and its severity as evidenced by the fact that nearly one-third of all cases of blindness can be referred to this cause, long ago attracted the attention of physicians and especially of obstetricians. Preventive measures were recommended, and the good effect of these is beyond doubt. Crédé's method is the best; it consists in washing out the vagina of the mother with a solution of corrosive sublimate, several times, before the commencement of the second stage of labour, and in dropping into each eye of the child a drop of some astringent liquid directly after birth, before the umbilical cord is severed. A 2 per cent. solution of silver nitrate may be used for this purpose; recently a 10 to 20 per cent. solution of protargol has been employed, or lemon-juice may be used, or iodoform may be dusted in. It is important, as already stated, that this treatment should be carried out directly after the birth of the child, because the experience furnished by lying-in institutions proves that this very early treatment influences the frequency of conjunctivitis much more than the same treatment later. To use some substance (protargol or iodoform) which is less irritating to the palpebral conjunctiva than the silver salt first recommended, is desirable too as a preventive measure because it prevents the possibility of an artificially produced con-

junctivitis and subsequent secondary infection of the inflamed conjunctiva. When gonorrhoeal conjunctivitis is present, preventive measures must be taken, and foremost among these must be the prevention of extension of the inflammatory process to the cornea, and its subsequent deleterious effects upon vision. This can only be accomplished by the immediate removal from the palpebral conjunctiva of the secretions. For this purpose, the eyes should be washed out with sterilized water or with a weak antiseptic. Potassium permanganate is especially to be recommended for its slightly astringent properties. I prefer to postpone the use of silver nitrate or protargol to a later stage, when the swelling and secretion of the conjunctiva are subsiding under the influence of the mechanical removal of the purulent discharge and the application of cold compresses. Experience has taught me that the healing process is accelerated thereby. I do not employ ice but only moderate cold, and thus avoid the risk of inducing superficial necrosis of the conjunctiva.

A further important factor is the protection of the healthy eye when one eye only is affected; it should not be covered up, because commencing inflammation which could be immediately treated may in this way be overlooked. Great care is required in washing out the inflamed eye; the stream should be directed from the inner canthus towards the outer to prevent any secretion from flowing towards the healthy eye; the sound eyeball should not be touched when treating the inflamed one. The hands should be most carefully cleansed with warm water, soap and brush, alcohol and ether; pieces of wool and gauze which have been used should be destroyed at once and this is best done by burning.

Care is required to prevent the purulent discharge from flowing into the mouth, or from getting into any abrasion of the skin, or from reaching the genitals, especially in girls. One nurse should be appointed to look after the eye, and her whole time must be given up to this. All linen used for the child should be washed separately; the child must be isolated and kept away from its brothers and sisters until

the normal appearance of the conjunctiva and microscopical examination of the secretion show that there is no longer any infection. The sick room should afterwards be thoroughly disinfected (see below) as well as all utensils, especially the bath. The irrigator used for washing out the eye, or at least the nozzle of it, should be destroyed. In institutions, where several such cases may occur at a time, the affected children should be isolated in light, well-ventilated rooms which have been previously disinfected, and their attendants should have been trained in the treatment of the eyes, and should not be employed for any other work at the same time.

During the passage of the child through the genital canal, infectious germs may reach the cavity of the mouth in the same way as they reach the eye, and may set up inflammation. There are no special prophylactic measures against this, but we can do something by avoiding any injury to the buccal mucous membrane. This subject will be dealt with later, when speaking of infections of the buccal cavity.

It is possible also for the germs found in the maternal vagina to become lodged in wounds of the skin, which have been caused during parturition, for instance, by forceps. After treating the eyes by Crédé's method and severing the umbilical cord, the child should be thoroughly washed and any lesion of the skin should be dressed with an antiseptic. By these means dangers from this source are averted. It is obvious that in institutions such children should be kept away from rooms in which there are patients with any purulent discharge.

And lastly, mention must be made of infection of the genitals and of other infections occurring during birth. The former occur principally in girls and cause vulvo-vaginitis, and in cases which are suspicious Epstein recommends that the vagina should be washed out with a weak antiseptic lotion, such as one of potassium permanganate and a 2 per cent. solution of silver nitrate injected as a precautionary measure. Infections at the anal orifice during parturition can only be influenced by very careful cleansing of this region in the first bath.

The child, after its expulsion from the uterus, is in a medium richly supplied with microbes, some of them pathogenic, and the fact that parts of its body, such as the mouth and the alimentary canal, which contained no microbes at birth, are found a few hours later to possess a rich flora of microbes, shows clearly that many opportunities are afforded for bacteria to attack the delicate organism of the child, and that precautionary measures are required to limit these dangers so far as is possible. We shall briefly consider these various regions separately, commencing with that which is of the greatest importance in the new-born infant—the umbilicus.

During the division and ligature of the cord it is possible for pathogenic germs to reach the child's body by soiled hands, by scissors and ligatures which have not been thoroughly cleansed. The strictest cleanliness is therefore required; the interval which elapses between the birth of the child and cessation of pulsation in the umbilical cord should be utilized for a thorough disinfection of the hands. A double ligature, which has been previously sterilized by boiling, should be passed round the cord and tied, and the cord be divided with sterilized scissors. Elastic ligatures should not be used, for it is very difficult to sterilize them, and they possess other disadvantages. Different views are held about the measures to be adopted for the desiccation of the cord, and until the question has been finally determined it is best to carry out an accepted method and to guard against its dangers; no harm can result from taking precautions. The child should be put into a bath, of porcelain or metal by preference and having no corners, filled with water which has been boiled and allowed to cool down sufficiently. Gauze or linen which has been previously boiled should be used to wash the child, and not the ordinary unreliable sponge. The same kind of material should be used for drying the child, and the navel should then be bandaged. To prevent infection, it is necessary to ensure the mummification of the cord, which will then not afford a suitable soil for microbes, and further to hasten the falling off of the cord and to let cicatrization go on unhindered so

that germs may not enter the umbilical region. These requirements are best fulfilled by a dry bandage, which does not drag upon the cord and which permits access of air. For this I employ a piece of cotton wool cut in the form of a rectangle with a hole through the middle for the umbilical cord, and fastened by a short binder passing round the body. Cotton wool intercepts germs which are in the air much more efficiently than gauze, and fulfils all other requirements. The question of the protective bandage appeared to have been definitely answered, yet it has recently again come to the front, together with the question whether, with the object of preventing possible infection, it is better after the first bath of the child to postpone the second bath till after the cord has fallen off. I do not approve of this method and do not think there are well-founded reasons for it; it has not been shown that cicatrization of the umbilicus has been delayed by the daily bath; the danger of the entrance of germs through this proceeding is reduced to a minimum if the bath is carefully cleansed and boiled water is used, and the daily bath has a number of other hygienic and prophylactic advantages which far outweigh the disadvantages. The best way to prevent the cord from being dragged upon is to have it as short as convenient, and to handle it as little as possible each time the bandage is changed. The use of dusting powder is unnecessary and has its inconveniences; the substances generally used are not free from germs, and antiseptic powders are sometimes not well borne, for example, iodoform often causes eczema, and sometimes they delay mummification; they are, therefore, best omitted. After the cord has fallen away, a piece of cotton wool should be kept over the navel to protect it from dust, until complete healing prevents the possibility of germs entering by this channel. The bandage must be renewed whenever it becomes soiled by faeces or urine, and in every case it should be changed at least once a day directly after the bath; the strictest cleanliness here, too, is needed, and hands which have touched the soiled bandage should be thoroughly cleansed before they are used to put on the fresh bandage. These details cannot be too often emphasized,

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especially as the directions are not carried out by the doctor but by nurses, and need to be strongly impressed upon them by demonstration and by supervision to see that they are understood and carried out. In private cases, such infection by contact plays a far less important part, though even here it may happen that a nurse who is entrusted with the care of several mothers and children may dress a child suffering from erysipelas of the umbilicus, and then after merely washing her hands dress a healthy navel. If it is unavoidable that she should attend to both cases, and even to other cases, then, at whatever personal inconvenience to herself, the infectious case should always be the last in turn, and the hands should afterwards be thoroughly cleaned and nothing more undertaken on that day. Midwives who attend to patients who are ill with puerperal fever should not undertake any other cases, and this is even more important still for the doctor who, with his knowledge and conscientiousness, should set an example to those under him.

Before passing on to other possible ways of infection of new-born infants and the measures for their prevention, I will briefly allude to a few general rules. The child should always be attended to first and the mother afterwards. In this way only is it possible to make sure that no maternal secretions are carried to the child, for even the normal lochial discharge may contain germs that are infective for the child. I have already mentioned the bath ; with regard to the bath water, boiled water should be used till the umbilicus is perfectly healed, and so long as there are any skin lesions or inflammatory processes with loss of substance. I have spoken also of the washing materials ; no sponges, but pieces of gauze or boiled linen should be used. I would only add that water in a separate basin and fresh pieces of linen should be used for washing the face, otherwise germs cannot fail to be carried to the face which have got into the water from the skin or bowel. The bath should be thoroughly cleansed each time after use and then carefully covered over till next required. The same bath must never be used for several children

after merely changing the water and rinsing out the bath; when it is necessary to use it for several children it must be thoroughly cleaned out for each child and the bath must be of metal or earthenware to make sure that it can be thoroughly cleaned. Great importance should be attached to this matter in institutions, as very serious consequences have occurred through infection conveyed by the bath water, the baths or the sponges.

The mouth should be cleared directly after birth, and sometimes this is directly indicated as in asphyxia. It should be done by the doctor and every care taken to avoid injuring the mucous membrane and so opening a door for the numerous microbes which are present in the mouth. When it becomes necessary to pass a catheter into the air passage great care must be taken not to injure the mucous membrane because very severe infection has been observed after intubation. The subsequent cleansing of the mouth cavity with a piece of linen on a finger, which the nurse generally does daily after she has bathed the child, I look upon not only as superfluous but also as directly injurious. Superficial lesions of the epithelium can scarcely be avoided by this procedure; the so-called *Bednar's aphthae*, which may be the starting point of the severest general infection, has been proved by Von Epstein and myself to have been caused in this way. Thrush is also apt to follow these manipulations of the mouth which have artificially produced the stomatitis necessary for this condition, and the germs may be carried in by the finger nails. In short, a number of troubles may be caused by the procedure without any advantages which might compensate for them. As to thrush, catarrh of the buccal cavity and dyspepsia are the conditions necessary for its development; if the buccal catarrh is only a part of the general digestive trouble then washing out the mouth will not prevent thrush. If the thrush is of a directly contagious nature interference with the mouth may convey infection—in short, in breast-fed children there is no good reason whatever for undertaking it, and my experience has been that under ordinary normal conditions, nothing

but good has resulted from its omission. The case is different when the child has to be artificially fed, and there is frequent regurgitation of milk, and large flakes of curdled milk lodge in the buccal pouches and afford a suitable nidus when the temperature is favourable for the growth of the microbes which are already in the mouth or are brought there by the milk and which may set up irritation. When the child is artificially fed I have the mouth cleansed each time the child is fed. This is very carefully done with pledgets of cotton wool and never with a camel hair brush which cannot be properly cleaned. In breast-fed children any affection of the mouth, if it does not already exist, may be prevented by washing the nipples of the mother or wet nurse with a 2 to 3 per cent. solution of boric acid both before and directly after the child is put to the breast. If some affection is already present—and there are cases in which gonorrhoeal stomatitis exists when the child is born—the chief care must be to prevent the inflammation from extending to the pharynx and larynx, or to the salivary glands, or especially to the middle ear. This is done by early and careful treatment, the principles of which cannot be entered into here. The importance of the mouth as a place of entry for infectious germs has been sufficiently dwelt upon, and the mucous membrane of the nose must next be considered, though the infective process begins here much less frequently. Nevertheless attempts are often made in the nursery to remove inspissated nasal secretion with a twisted corner of the handkerchief or with hairpins and such things have been observed sometimes to produce abrasions and sometimes to convey germs and implant them. The germs most commonly so conveyed are the pyogenic streptococci so frequently found on the scalp and in the nasal cavities of adults. Many cases of erysipelas, starting from the nasal cavity, and many cases of rhinitis are produced in this way. To prevent this danger all such methods of clearing the nostril should be forbidden; the inspissated secretion may be removed by washing out the nostril with lukewarm sterilized water

or a weak antiseptic, or by pieces of cotton wool lubricated with boracic vaseline or some other pure fat.

Infection may also begin in the skin of the new-born infant which demands therefore special care. When removing the vernix caseosa, at the first bath, care must be taken not to cause any injury to the skin. If there is a cutaneous wound, it should be protected by a dressing and should be watched so that steps may at once be taken to prevent its extension if inflammation sets in. A daily bath is a great protection against erythematous, pustular and ulcerative eruptions on the skin which may be the starting point for a general infection especially when the eruption appears in the perineum. Further preventive measures consist in changing frequently the diapers so that faeces and urine may not remain in contact with the delicate skin, and that the microbes contained in the faeces may be removed from the skin. The kind of linen used and the way in which the diaper is put on are also important, because the skin is mechanically irritated when the linen is coarse and fastened tightly. Linen soaked with urine should not be used again after merely drying it; the chemical products and the bacteria of the urine would both irritate the skin. When washing the anal and genital regions rough handling is apt to cause wounds and infection; it is best to wash these parts with pieces of cotton wool dipped into lukewarm boiled water and then to mop the parts with dry cotton wool. The cotton wool should be kept wrapped up in a clean cloth or in a box, and a fresh piece should be used each time. Even greater care is required when there is any eczematous eruption; it should be treated at once, and some protective material should be used to prevent the infection from becoming more extensive and deep. In bathing the child cleanse the skin and remove all secretions which have accumulated between the fold of the skin, especially at the neck, axillae, and groins in fat children. If allowed to remain the secretion softens the skin and produces intertigo which may develop into a wide spreading inflammation of the skin or even into general infection. The secretion should

be carefully but thoroughly removed and a piece of cotton wool placed in the folds to prevent friction between the two adjacent surfaces. A careful look out must be kept for the many different nodular, pustular, and ulcerative eruptions which may appear on the skin of the infant. When pus is present, especially in the diseases accompanied by the formation of pustules or by superficial and deep abscesses, preventive treatment consists in antiseptic compresses and dressings and early evacuation of the pus. It is obvious that the physician's hands should be thoroughly cleansed both before and after dressing the patient; that soiled dressings should be at once destroyed; and that the sick child should be isolated from the other children of the family. In institutions perfect isolation of these cases is most essential and should be strictly carried out. What has been said applies also to erysipelas and to cellulitis. The possibility of the conveyance of infection by soiled linen or by the utensils and bath, etc., used for the child must be remembered, and especial care be taken for its prevention.

Infection may also arise at the anus, either by extension from inflammations of the adjacent skin, or directly as from fissures or ulceration of the mucous membrane at the lower end of the rectum, but these cases are comparatively rare. Prevention consists in careful treatment of any inflammation in the vicinity of the anus, in care when washing the perineum and in regulating the evacuations of the bowels, because, as will be later pointed out, the nature and number of the evacuations may also be a cause of these inflammations.

Lastly, mention must be made of the genital organs, especially in the female, which apart from the infective processes already described may be the seat of catarrhal, suppurative, and even gangrenous processes mostly caused by some local infection. Here, too, absolute cleanliness and the avoidance of any mechanical irritation, or softening of the skin by urine and faeces are of great importance. The extension of inflammation from adjacent parts of the skin, and the importation of germs from other parts of

the body or from the outside, are also of the utmost moment. Dried secretions or masses of epithelium cast off by the vigorous desquamation of the first few days of life should be removed by washing and the parts should afterwards be dabbed with dry cotton wool. When inflammation of the genitals already exists the chief aim of prophylactic treatment is to prevent the extension of the mischief and to heal quickly the local inflammation. The principal ways in which infection may enter the body of the new-born infant have now been considered, and their prevention explained, and I will add a few words about the nursery considered in its relation to the prevention of disease. The room selected should be light, well ventilated, and one that can be warmed; the floor should be such that it can be easily washed; for instance, it may be varnished or covered with linoleum. Furniture which creates or collects dust, such as curtains or upholstered armchairs, should so far as possible be avoided. The cradle should be made of material which can easily be cleaned and there should be at least two sets of bedding so that it may be possible to change it completely in case of need. Washing soiled diapers and drying them in the nursery is altogether to be condemned, and in institutions I regard the correct disposal of the excreta and washing of soiled linen as most important factors in preventive measures. It seems to me to be best to put the soiled diapers and soiled linen, or linen which has been changed for some other reason, at once into a covered vessel kept in the room and containing a solution of corrosive sublimate (1 part in 2,000); this will not injure the linen and the clothes can remain in it till they are afterwards washed. This is the safest way of preventing germs from getting into the air, whether from dried excreta or from liquid faeces; and at the same time this treatment of the linen serves to disinfect the faeces and they are made innocuous by the antiseptic and may be poured down the water-closet directly the linen has been removed from the vessel.

Thermometers are a further source of infection; they

should be put into a strong solution of potassium permanganate after use and be rubbed dry and smeared with a pure fatty substance such as vaseline (which is kept in a closed jar) before being used again. In newborn infants the temperature is almost invariably taken in the rectum and germs can thus be readily conveyed; new thermometers should therefore be used. In institutions a special thermometer should be kept for each child, which can be destroyed after it has been used for any infectious case, because reliable disinfection of the instrument cannot be attained even by the method above described. These apparently trivial details are in reality most important, and it must not be thought absurd that I refer to them emphatically and at some length.

Opinions differ as to the possibility of infection through the air; my own experience has taught me to regard this as possible, so that in addition to infection by contact I ascribe an important rôle to infection by the air. In institutions, especially when there is not sufficient room and the place is over-filled and difficult to ventilate and to clean, this is a much more important factor than in private houses where, indeed, it is only in the lowest classes that the squalor and the large number of children exercise a baneful influence. The experience of hospitals conducted upon modern hygienic principles and of foundling-hospitals has shown that much can be done in this matter by adequate hygienic precautions. A sufficient number of light, airy large rooms with but few patients in each room must be provided, the floors, ceilings and walls must be easily cleaned; smaller rooms must exist for isolating infants suffering from infectious disorders. It should be possible to use the rooms in turn and to disinfect them thoroughly in the interim. There should be special attendants for the different classes of disease. It is self-evident that in private houses, too, adequate ventilation and thorough cleaning of the nursery are required, and all unnecessary raising of dust should be avoided as by using damp cloths for dusting and the child should be in another room while the cleaning is done.

Some of the preventive measures recommended in the foregoing apply also to older children, for there is no sharp line of demarcation in this respect, and certain ordinary hygienic and prophylactic principles are true for all pathological conditions. Nevertheless, during the first few days of life there is a greater susceptibility to the injurious action of bacteria from without, to the transition from a latent to an active state of the micro-organisms which get lodged in the various cavities of the body, and to general infective processes which are then very common. Preventive measures are therefore more urgently needed than at other times and for this reason I have entered fully into them here. Premature children are very susceptible to infection of every kind and need very special attention; the apparatus used to produce artificial warmth for them such as incubators must be thoroughly disinfected after each time it is used; but the skin must not be made too hot by these or by the use of hot-water bottles, otherwise irritation of the skin is readily set up and it may then be invaded by bacteria.

PREVENTIVE TREATMENT DURING INFANCY

In the introductory paragraphs I pointed out that a certain number of morbid processes are especially rife during this period of life; and foremost among these are the very fatal diseases of the gastro-intestinal tract. We shall therefore begin with the measures which can be taken to prevent an attack of these disorders; next we shall consider the prevention of complications, and lastly, the measures required to check the spread of the disease. And here the hygiene of the feeding of infants coincides to a great extent with the preventive measures required and it becomes necessary to sketch its main outlines.

We cannot too often or too forcibly emphasize the principle that, with very rare exceptions, the infant thrives best when it is breast-fed by its own mother and in accordance with rational rules. The endeavour to spread this principle must be made not only by the family

doctor whose advice is often not sought or is sought too late, but by all who have an opportunity of giving advice in this matter. I am aware—indeed no unprejudiced observer can close his eyes to the fact—that in certain sections of the population the modern ways of living and claims of life have during the past few years acted against the nursing of infants by their mothers; on the other hand, if we can enlist the active help of those to whom reference has been made above, I do not think that it is too late to bring about a great change in this matter and to secure for coming generations of children their natural source of nourishment. The subject must not only be treated as an ethical question but also as one of preventive treatment in connection with the feeding and rearing of infants with far-reaching results. The colostrum found in the breast during the first few days after delivery fulfils the double object of preparing the stomach of the new-born infant both quantitatively and qualitatively for the breast milk and of promoting the expulsion of meconium contained in the intestines, and it may be assumed *à priori* that a mammary gland which has grown to maturity consecutively with the growth of the foetus and which has derived its materials from the same source as that for the foetus, namely, the maternal blood, will satisfy the individual requirements of the child more exactly than will the milk of a wet nurse however carefully she may have been selected after consideration of all necessary factors. There are certain vital tendencies which make for the preservation of the infant, such as the immunity against certain infectious diseases, which is imparted to the infant in utero by way of the placental blood stream, and experiments and statistics during the last few years have conclusively shown that such tendencies are also transmitted through the milk to the offspring. That there are individual characteristics in the milk of different women is shown by the fact that many a child which is perfectly normal and physically well developed does not thrive upon the milk of one wet nurse, though examination can detect nothing wrong in her, and that

the same child will thrive perfectly upon the milk of another wet nurse, though the other circumstances have remained unchanged. It is quite conceivable that the characteristics of the mother's milk are those which best fulfil the conditions required by her offspring. In short, there are many reasons why the mother should nurse her own child and very few why she should not, and we need be much less strict about the conditions which fit a mother to nurse her child than about those which fit a wet nurse. The only cases in which, according to my opinion, we may deviate from this rule are cases of profound anaemia, tuberculosis, cardiac disease, and predisposition to neurosthenia which is unfortunately so common; also cases where the nipples remain undeveloped in spite of everything that can be done during pregnancy to improve them, and lastly, cases in which an inadequate supply of milk which is generally also poor in quality cannot be increased in quantity by suitable food and by giving the breast to the child. And yet we have seen, too, that by perseverance, a sufficient milk supply has been established in women who were apparently delicate and not looked upon as able to nurse their infants. Rules of hygiene are necessary for the mother as well as for the child; the mother's food should be abundant, and easily digestible, but she should not, as so often happens, be overfed—this will only cause digestive disturbances which re-act unfavourably upon the production of milk and will not increase the fat or the quantity of milk. Mental rest and the indifference which is often found to an unwished for degree in hired wet nurses are rare in the young women of our generation, and yet are of extreme value for the child, and much as I value the use of scales, and advocate regular weighing of the infant, yet I cannot deny that this has a disadvantage when in the hands of nursing mothers whose minds are filled with teachings promulgated by popular works, and who become mentally depressed when the infant's weight is at a standstill or when its increase in weight on any given day is below that mentioned in these books; this mental depression is not without

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its influence upon the growth of the child. When the physician knows that there is this nervous disposition in the mother, or as soon as he discovers it, he will do well to have the child weighed as seldom as possible, that the weight may be distributed over longer periods, and may even himself weigh the infant; a small falsification of the result in these cases comes under the category of pious frauds—in short he must do what will be for the interest of both child and mother.

The condition of the nipples and breasts requires great attention, especially with the first child. The shape of the nipple should be improved during pregnancy by constantly drawing it out with a breast-pump and it should be hardened by washing with spirit, because fissures of the nipple often make the work of nursing the infant impossible or very difficult, partly through the pain caused by suckling and partly through the possibility of infection, both of the mouth of the infant and of the breast itself. The nipple should be washed before and after the child has the breast, and there is then, as has already been mentioned, no necessity for washing out the mouth of a breast-fed infant. When there is suppurative inflammation of the breast, I am strongly opposed to putting the child to the breast, even though there be no apparent communication between the abscess and the galactiferous ducts; the constant irritation caused by the suckling can only increase the inflammation and may bring about the communication which did not exist at first and expose the infant to the serious risk of direct absorption of the infected milk. In these cases it generally suffices to use the other breast only, and this sometimes undergoes compensatory hypertrophy, or if the child is old enough it may be fed partly by hand; or if it is only a few weeks old a wet nurse should be recommended.

The number of meals and the quantity at each require the greatest attention; the soundness of the digestive apparatus of the child depends mainly upon a correct régime, and mistakes made in this matter cause suffering not only during the whole suckling period but often also

in later life. A feed should be given every three hours and only one breast given at each feed; there should be intervals of six to eight hours during the night which are important also for the mother and her nursing powers. These are the general principles and they should not be departed from, in one or other direction, except in special cases where the condition of the child seems to make it necessary. The dyspepsia arising from overfeeding of the infant, often underestimated and occurring even in breast-fed infants, is the frequent cause of severe gastro-intestinal trouble. Not rarely it induces the development of constitutional maladies, and it prepares the way for other diseases, and yet the point most to be emphasized here is that it is preventible. These facts make it desirable that the advice of the physician should be given even for the healthy child; indeed, the object of preventive treatment is to restrict disease to an irreducible minimum by rational living and education. To judge correctly of any of the abovenamed conditions the physician must be certain too when the child is suffering from insufficient food, if breast-fed. Such cases are on the whole rarer than the converse cases, yet they do occur and require a very different treatment. By weighing the infant before and after feeding, by estimating the quantity of urine, the state of the faeces, the distension of the abdomen, the condition of the mother's breasts during the intervals between two feeds and other such points, it is possible to arrive at a correct decision, and according to the circumstances either increase the food or change the nurse. I will pass on and consider the question of suckling by a wet nurse. And I will begin with a few words about ethical considerations and objections raised on several sides. The neglect to which the wet nurse's own child is exposed, when she goes out to nurse another's child, has been pointed out; this objection is, in my opinion, not very great, seeing that we do not generally engage a wet nurse till two or three months after her delivery, and as it is the custom in Germany for the lower classes to begin to feed their children by hand at that age there is no special risk in weaning these

children. We may assume too that if the woman did not go out as a wet nurse she would have to go out to other work which would take her altogether away from her own child or at any rate would take her away during the daytime and her child would be no better off. There is no doubt in the mind of any physician as to the fact that the milk of a good wet nurse gives better results than the most rational and scientific hand feeding; on the other hand, it is equally certain, for reasons stated above, that the mother's milk is far better for her child than that of any wet nurse. I will briefly refer to the question of the selection of a wet nurse limiting myself to points which are absolutely necessary. It is evident that with a wet nurse we must insist upon qualities and conditions upon which we should not lay so great stress if a mother were nursing her own child. The wet nurse should be thoroughly examined to see that she is healthy; she should be between twenty and thirty years of age, her breasts and nipples well-formed, with plenty of milk. It is always an advantage and in suspicious cases it is even essential to see the nurse's own child and judge of its state of health and development; on the other hand, not much importance need be attached to the natural disposition or colour of the hair of the nurse, the diet of the wet nurse must not be suddenly changed from the simple poor diet to which she has been accustomed, to the rich abundant meat diet of the household of which she now forms part. Do not give much meat to those who have been accustomed to a diet largely consisting of vegetables; do not give them too much liquid or compel them to take alcoholic beverages when they have not been accustomed to take alcohol. Let them work and take exercise to prevent them from becoming less capable physically of nursing the child. Watch carefully to see that the hours fixed for the infant's meals are regularly adhered to, and on the other hand take care that she gives the child no other food when she takes her own meals. The mother's constant supervision is needed to see that the infant is well cared for, otherwise it may easily happen that instead of removing wet diapers,

which are uncomfortable and cause the infant to cry, the nurse will quiet the child by putting it to the breast—a procedure which will produce those dyspeptic troubles to which I referred above and which turn a peaceable nursery into a pandemonium. For similar reasons the wet nurse should never be allowed to go out alone with the child; her lack of knowledge induces her to cover up the infant when it is out of doors and it runs a greater risk of taking cold afterwards. The mother should always herself bathe the child and look after the cleansing of the nose and ears, otherwise harmful results may follow. In short, one must not rely upon this stranger in any way and the physician must impress upon the mother the great necessity for supervision.

Further, the infant must never sleep in the bed with an adult, not even with the nurse, partly for hygienic reasons, partly because of the danger of overlaying. When possible the wet nurse should sleep in the room adjoining the nursery, so that the air may not be necessarily contaminated, and if she is wanted at night she can be called. Her physical health must not be neglected, because disturbances of physical functions react upon the infant and may cause very unpleasant disorders. In case of any serious illness in the nurse, our action must be according to the nature of the illness. Temporary indisposition, even when of infectious nature, such as acute tonsilitis, is not a sufficient reason for taking the child from the breast; the breast should still be given, but in the intervals between feeding the infant should not be with the nurse. An illness which will be of longer duration or one which is readily communicable is a sufficient reason for taking the child from the breast, even though there may be no experimental proof that the milk is affected; as a rule, changes soon appear in the secretion of milk which make suckling impossible. On the other hand catarrhs, indigestion and similar indispositions afford no valid reason for making any change, but these ailments should be cured by remedies which do not pass into the milk and so injure the infant. There need be no fear if menstruation should

begin again, for even if, as Schlichter maintains, the infant does not thrive quite so well during the menstrual period and often exhibits some disturbance, always trivial, yet the disturbances are quite transient. The recommencement of menstruation is harmful because it makes a fresh conception more possible, and the changes in the milk secretion produced by conception prohibit further suckling.

Without separately considering the different forms of mixed diet, such as are especially preferred by the French, I will at once proceed to the subject of the artificial feeding of infants. There is danger for the infant which is unwisely fed even though its food be derived from the mother's breasts or from the wet nurse, but these dangers are rarely great enough to imperil its life. Conditions are however very different in a hand fed infant, and these dangers are enormously increased. It must be clearly understood, in spite of all assurances to the contrary, that the artificial feeding of the infant from its birth deprives it of many advantages to which reference has been made above, and is also one of the most difficult and troublesome problems. Cow's milk is most frequently used, and we shall first consider the dangers connected with it. They may be regarded from three aspects: the chemical, the bacteriological and the quantitative. As to the chemical, not only do we know the difference in percentage composition between the two, but work done during recent years in various directions has shown us also what are the differences in the elementary structure between human milk and cow's milk. And now we know that cow's milk contains about twice as much proteid, and about half the quantity of milk sugar and more fat and more salts than human milk; the casein derived from cow's milk is far less suitable for the infant than that from human milk; and the relation between the nitrogenous and the non-nitrogenous constituents of cow's milk is one which is far less adapted to the requirements of the growing infant than that in human milk. We are also now well informed about the difference in the elementary structure between casein from

cow's milk and from human milk, about the constitution of the different fats in milk, and the solubility of the salts, and have come to the conclusion that the most careful calculations and attempts to make cow's milk similar in constitution to human milk must all fail because we are working with substances differing chemically. Apart from these facts we have in human milk a food the quantity and composition of which are adapted to the requirements of the child at different periods, while with cow's milk we can attain only a certain average composition, and the infant's intestinal tract must first adapt itself to be able to digest this. There are also other factors: the difference in coagulability and capacity for absorption of the casein, the totally different mode of absorption of the fat, the absence from cow's milk of certain substances, such as nuclein and lecithin, the deficiency in iron, the great capacity exhibited by the salts in cow's milk for combining with the hydrochloric acid of the stomach—all these make increased demands upon the digestive apparatus, and we can never tell beforehand that the intestinal tract of the infant will adapt itself to these conditions, and that there will not be a deficiency in the materials required for building up certain tissues. For these reasons, in spite of every precaution which can be taken against accidental disturbances, and in spite of absolute cleanliness and regularity in feeding, dyspepsia often arises in children brought up on cow's milk—almost a physiological dyspepsia—and lays the foundation for serious gastro-intestinal disturbances which may set in with astonishing rapidity and severity. Many attempts have been made to lessen these dangers, and we have succeeded in obtaining a number of preparations and modifications of cow's milk in which the chemically injurious effects of ordinary cow's milk have been to a certain extent overcome, but these products are far inferior to human milk in fitness as a perfect food; for human milk gives rise to no troubles and assures the steady and satisfactory development of the infant. This fact must be firmly grasped, so that we can state the objections against

these artificial foods, and on the other hand watch very carefully for the slighest digestive trouble, and treat it correctly at the very beginning.

A second class of injurious effects arises from bacteriological infection, and here, although we have to deal with a large number of opinions, we have not yet reached any definite conclusion. I will rapidly pass over the fact that the mother's milk and the nurse's milk are unboiled, while cow's milk is frequently given to the infant after the milk has been boiled, and that the boiling causes a modification in the nitrogenous constituents and salts which renders the milk less digestible. This cannot be avoided, and Biedert's idea of getting cow's milk in an aseptic state and using it unboiled is at present a somewhat impracticable suggestion. The danger of transmission of tuberculosis, or of foot and mouth disease, has been considerably minimised during the last few years by the greater attention devoted to the examination of cows by farmers and owners of dairies, and by the destruction of pathogenic microbes by boiling the milk.

Recently it has been proposed to so heat[1] the milk that its flavour may not be interfered with. I must refrain at present from giving an opinion in respect of milk so treated, as I have had no personal experience of its use. Besides pathogenic organisms there may be an enormous number of bacteria in milk, which are derived from the dust of cowsheds, the excrements of the animals, the hands of the milkers, the water for washing the milkpails, the cloths used for straining the milk, and from the many utensils into which the milk may be put before it reaches the consumer.

These micro-organisms sometimes cause fermentation of the milk sugar with the formation of lactic acid, sometimes bring about changes in the nitrogenous substances with the formation of toxic products, and in other cases produce injurious effects in the digestive apparatus of the infant by their mere presence.

The following points are also important: the com-

[1] The author is, both here and overleaf, apparently referring to pasteurization.

bination of free hydrochloric acid with the salts of cow's milk and the loss of its antiseptic property, the formation of other acids and gases in the stomach of the hand-fed infant, and the loss of tone of the stomach caused by the increased work and over-distension. This loss of tone extends also to the intestines where it manifests itself by enfeebled peristaltic action and an altered reaction of the intestinal contents in children brought up on cow's milk. When we consider these facts it becomes obvious that we must be prepared to overcome the dangers arising from this source. This has led to the introduction of processes for the sterilization of milk, the details of which cannot be here given; suffice it to say that too great reliance must not be placed upon these methods, that we should regard with suspicion milk which has been sterilized in the cow-shed, and further that the quantity to be sterilized at one time should not exceed the quantity needed during twenty-four hours in winter or during twelve hours in summer, and it should be kept at a temperature below 45° F. before it is used. As further precautions we may mention that milk which has been warmed and is being kept warm artificially by being wrapped in flannel or in a bottle warmer should not be taken for the child when going on a long journey. The feeding bottles must be kept absolutely clean, and should have wide necks and no projecting shoulders, the teats and milk vessels should be clean, as also should the hands of those who have to deal with the milk, because pathogenic germs may collect under the nails and on the skin of the hands. In institutions artificial feeding is apt to be followed by very bad results, and therefore in these places greater stress still must be laid upon all precautionary measures; the dangers are greatly increased because of the many hands through which the milk has to pass, and of the possibility of infection of the milk by virulent germs from the air of the wards and from suppurative processes.

I have already stated that I regard the washing of the mouth of healthy breast-fed children not only as superfluous but as injurious in certain respects, but I do not hold the same view as regards infants brought up by hand.

The milk probably already contains some germs, and with the regurgitation of food into the mouth, which is so common in these children, large flakes of casein become lodged in the cheeks and in other parts from which they cannot be easily dislodged by the tongue, thus affording a suitable soil for numerous microbes; and for this reason I consider it best to wash out the mouth gently after each meal. It must be done very carefully, so as to avoid injuring the mucous membrane, or inducing vomiting, which is so apt to occur in these infants and which would only frustrate our object.

Further, injurious effects in feeding with cow's milk arise from mechanical overloading of the stomach and intestines. They include the ill effects of the dyspepsia caused by overfeeding, together with other evils caused by a food which is difficult of digestion, often contains germs and is too long in the distended digestive tract.

Provided that there are the regular intervals between the times of feeding, and that the mother's breasts and nipples are normal, a breast-fed infant takes the breast, lets go the nipple as soon as its hunger is appeased and generally falls asleep. The act of sucking the breast of the mother or wet nurse is, with a few exceptions, work which tires the infant and induces sleep; but it is otherwise with a child fed on cow's milk. The short tubeless teats of feeding bottles, introduced in the last few years because of cleanliness and almost universally used, enable the milk to get into the stomach with very little effort and with great rapidity. Large quantities of air are generally sucked down with the milk, the feeling of tiredness after doing work does not set in, a larger quantity of milk than is required gets into the stomach and is more difficult of digestion. The undue delay of the food in the stomach and the abnormal formation of gas produce atony of the walls and over-distension—conditions well known to every physician.

The close connexion between gastric and intestinal digestion and the rapid extension to the intestines of any gastric disturbance may give rise to intestinal disorders

which at the slightest provocation pass into the severest forms of gastro-enteritis. Contrivances devised to imitate the mechanism of breast-feeding, such as long tubes with valves in the stopper of the feeding bottle, or valves at the sides of the bottles, answer the purpose to some extent, but have the disadvantage of making it difficult if not impossible to clean the apparatus thoroughly, and therefore do not really help. It is better to give a measured quantity of milk adapted to the age, weight and size of the infant, in accordance with tables drawn up by different authors, the best of which are Escherich's, based upon the volumetric method. But here we are dealing only with averages, and it becomes difficult to individualize for any given case. The method also is somewhat complex, and would be beyond the intellectual grasp of some of the women into whose hands the preparation of the infant's food is entrusted. We must remember that the rules for the artificial feeding of infants have to be put in a form which is simple enough to be carried out by any one.

I know that the preceding pronouncements will meet with much criticism, especially from German readers, and that my views about the difficulties and dangers arising from feeding infants on cow's milk will be regarded as much exaggerated. The standpoint I take may be explained by the fact that my work lies in a district where infants are suckled, and that I have had many opportunities for observing the very great differences between these results and those obtained from the methods of artificial feeding described above. It is possible that the greater personal experience and the greater intelligence of a people who interest themselves more in this matter, and the better conditions and more careful preparation of the cow's milk which result from this, may make the results more favourable than they are with us in the country; yet when I compare the rates of mortality among breast-fed and artificially fed infants and note how insignificantly these have been influenced, in spite of the great progress made in the art of artificial feeding during the last decade,

I am forced to the conclusion that the statements I have made are for the most part not exaggerated.

After the various preparations of cow's milk, we must next consider condensed milks and the commercial products known as permanent sterilized milks. They have the advantage of being free from germs when they reach the consumer, but possess a number of other bad qualities. Some contain a large proportion of cane sugar, others have a disagreeable flavour and if used exclusively for a long time are said to produce not only the ill effects common to all methods of artificial feeding, but also to cause scurvy-rickets (Barlow's disease). About the latter I have no personal experience, as the disease is quite unknown in this part of the country.

The prepared foods for children, many of which are already in the market, while others are being added to the list almost every year, possess some advantages. They are easy to prepare, can be kept a long time, and are relatively free from germs. On the other hand they are most unsuitable during the first months of life, because the child's powers of absorption cannot be altered; they tend to cause obstinate constipation and often give rise to severe gastro-intestinal complaints.

A rational hygiene for the first year of life, the object of which is to preserve the normal condition of the digestive organs of the infant and to ensure the satisfactory development of the child, must include a decision as to the time when a breast-fed infant should receive additional food, and when it ought to be weaned from the breast. I will briefly answer this question. Food should be given in addition to the breast milk when failure to increase in weight or too small a weekly increase of weight for some time shows that the mother's milk or wet nurse's milk is insufficient. This may not occur till relatively quite late, and there are many children who thrive exceedingly well up to the tenth or twelfth month on breast milk alone. But the commencement of the second half year of life seems generally to be the time at which additional food is required. How this is to be given cannot further be detailed in this place, I will merely point

out that a gradual and slow increase of food is more rational and less dangerous than a sudden addition. Concerning the choice of food—my custom is first to give a thin soup to see whether the child can take any additional food; later breast-feeding once a day will be sufficient, and pap may be given, and thus the infant is gradually weaned in the course of two or three months. By this method we avoid any sudden change, and further there is the possibility of returning to breast-feeding if digestive disturbances make it necessary.

What has been said about additional feeding applies also to weaning, indeed the former is only to prepare for the latter. The more gradually the weaning is carried out, the fewer will be the dangers arising from it. We can gather no physiological rule as to weaning from the development of the infant; the time for dentition is so inconstant and is dependent upon so many factors that it cannot be used as our guide. The same is true of the change which shows that the limit for assimilation of milk sugar is passed, which cannot in practice be readily enough determined to serve us as a guide. That whenever possible weaning should not be postponed to the hottest season of the year is self evident.

I have already stated that for the additional feeding of breast-fed infants, and later for the entire feeding of the weaned infant, I use a suitable preparation of cow's milk, soups and various forms of pap. Eggs I like to avoid during the first year of life, because exact experiments have shown me that diarrhoea, with very offensive motions, has followed the use of eggs; and meat, even when hashed or minced, I would not give until the fourth half year of life, because I have observed a number of cases of intestinal irritation set up by giving meat early. These are not definite rules for feeding, but merely advice one can give, and parents will often without the knowledge and consent of the physician fail to carry out the advice, and yet the children may not suffer any ill effects. On the other hand, if the parents have been told of the dangers, they cannot blame the physician if ill effects do result.

It is now time to end this long chapter about diet during

infancy, and to turn our attention to the preventive treatment, in a wider sense, of intestinal disorders. And here we have two objects in view: firstly, to prevent further extension of the disorder by adopting treatment at the very commencement of the illness; and secondly, by suitable precautionary measures to prevent complications from developing. And lastly, especially in institutions, we must bear in mind the important fact that a number of these disorders are very infectious, and we must do our utmost to prevent the disease spreading to others.

Sufficient stress is not laid upon the fact that gastro-intestinal disease in infants, even though it appear as a most acute process, is not in most cases really so, but develops upon a soil long prepared for it as it develops after repeated slight attacks. Just as, on the one hand, it is possible by keeping a careful watch over the feeding to prevent the greater number of cases of digestive troubles, so too it is possible by careful observation to recognize these minor disturbances or alterations in the digestive process, to remove them by adequate measures, and thus to prevent an outbreak of more severe disease. It is evident that this requires an exact knowledge of the physiology of digestion in the infant, that the greatest attention should be given even to the most trivial symptoms, and that we must not rely upon the increase in weight alone, because the weight may be quite satisfactory in children with slight gastro-intestinal trouble. The serious illness which often quite unexpectedly sets in with great intensity and rapidity, and resists all treatment or proves very intractable, places the physician in a very difficult position, for which he is himself partly to blame. We should therefore pay special attention to the general appearance of the child—the play of its features, the condition of the buccal mucous membrane, the number and nature of its evacuations and its sleep. We should note also the vomit if such occur, the state of distention of the abdomen, the condition of the anal region and the frequency of micturition. These various points cannot here be dealt with in detail, and for further information I would refer the reader to the excellent article by Von

Epstein in the "Handbook of Practical Medicine." These conditions require our most careful attention, and immediate treatment of them will generally prevent the threatened gastro-enteritis. That this is a very grave danger in artificially fed children, and that it requires greater attention than the physician generally bestows upon it, is obvious from what has been said above. Though, at this period of life, the most serious and dangerous digestive disorders are the apparently acute disorders which set in when the infant appears to be in perfect health, yet the most troublesome ones which the physician is called upon to treat are those chronic digestive disorders, the seeds of which were sown mostly by improper feeding and by disregard of previous premonitory and slight digestive disturbances.

Next we come to cases where the disease is already fully developed and where prophylactic treatment is required to prevent the disease from becoming general and to prevent accidental complications. To treat this subject exhaustively would compel me to go over the entire field of the pathology of digestive disorders in the infant: I shall therefore restrict myself to giving a few examples. The first thing to be done is to expel the infective material from the gastro-intestinal tract, or to render it innocuous, to remove fermenting masses, to dilute the toxins, and to bring about conditions which are not favourable to the growth of intestinal microbes. These indications can be fulfilled by the mechanical emptying of the stomach and intestines, and by the administration of harmless liquids such as tea or boiled water. It is important that the mouth should be kept clean, because infective processes may spread thence to adjacent cavities, to the salivary glands or downwards to the oesophagus. The swallowing of infected secretions should be prevented because it may produce disease of the lungs. The skin needs careful attention, because infectious processes often begin in the skin and thence invade the body. Diapers soiled with faeces or urine should at once be removed and thoroughly disinfected to prevent infectious intestinal germs from

getting into other cavities and infecting them. The greatest cleanliness is required as regards the hands and linen and all utensils used for the child. Purity of the air in the room is also important, and other similar preventive measures already suggested in the earlier pages should be adopted.

Very special precautions are needed in institutions, for many of the morbid processes considered are extremely contagious and readily spread to the greater number of the children kept in the institution. There are various ways in which the infection is spread, all of which should be kept in mind. It is safest when possible to isolate these cases completely, and to appoint special attendants for them. The diapers and child's body linen should be disinfected with solution of corrosive sublimate and then washed separately from the other linen. Each patient should have a separate thermometer and bath. The feeding bottle and teat and all utensils used in preparing the milk should be kept separate from the rest. After a death has occurred from such a disease the room and all its contents should be thoroughly disinfected, and infected objects should be destroyed. If complete isolation of these children is impossible the cubicle system may be tried, which was introduced into the children's hospital at Paris by Grancher. Each child suffering from an infective disease is in a small cubicle separated off by curtains from the rest of the ward ; all utensils used for it are kept in the cubicle ; and the child is attended to by one special nurse. The physician wears a linen overall, and before leaving the cubicle disinfects his hands thoroughly. To diminish the risk of germs being carried by the air, partly directly and partly by getting into the food or feeding bottles, the room must be well ventilated. The air in it should be often changed ; the walls, ceilings and floors should be such as can be easily washed ; and the dust may be reduced to a minimum by having furniture of glass and iron which can be easily cleaned, by having no corners in the room, and by dusting with a damp duster. These precautionary measures are not purposeless and excessive. The great value of such precautions has been

proved by the results obtained in newly erected institutions which were planned and built and fitted up in accordance with the views above expressed.

As already stated, this chapter is devoted to diseases which mostly affect children in the suckling period, and I pass on therefore to speak of preventive treatment in congenital syphilis. Syphilitic infection may be acquired by the infant in various ways, namely from a syphilitic wet nurse, from utensils, feeding bottles and sponges used for other children who are syphilitic, from sleeping with a syphilitic person, and from kissing by one whose mouth is affected with the disease. Such cases belong to the group of acquired syphilis, and begin with the typical initial lesion and show no special modification in their course at the various periods of life. Preventive treatment consists of the ordinary measures for the prevention of syphilis. We can leave therefore the subject of acquired syphilis and pass on to congenital syphilis, which affects the infant in utero, whether it be inherited from the father, from the mother, or from both parents, and consider whether it is possible by treatment to prevent inherited syphilis, or to prevent an outbreak of syphilitic symptoms in a child born apparently healthy. Here, as I pointed out in the introductory remarks, factors are concerned which do not fall within the sphere of the physician's influence. We are in a position to state what has been amply verified by the investigations of inquirers into this special subject, namely that syphilis can by long and energetic treatment be cured so completely as to leave scarcely any risk of infection possible for mother or offspring. But it is seldom possible to induce the man to submit to this prolonged treatment before he marries. Often he conceals the fact that he is diseased, barely waits even till the manifest symptoms have disappeared, and then, without any precautionary measures, by sexual connexion seriously injures a young life entrusted to his care, and of an entire generation some are destroyed and some are brought into the world heavily handicapped. When, as is unfortunately often the case, it is not possible to cure syphilis in the husband by a

long and energetic treatment, we must at least endeavour to mitigate its effect upon mother and child by suitable measures. There are, as is well known, several possibilities: the ovum may be infected from the paternal side, and abortion, premature delivery, or still birth may be the result, or the child may be born with syphilitic symptoms, or the symptoms may develop in the course of a few weeks; but the mother may be free from syphilis and may remain free, having been made immune by the foetus, according to Colles' law. In other cases the mother becomes infected by the father who has recently become syphilitic, later she becomes pregnant, and the pregnancy ends in one of the ways just enumerated. And lastly, the mother may become infected after conception has occurred, and the ovum which was healthy may subsequently become infected with syphilis. Further, it is important in preventive treatment that we should know whether in any particular case the woman is a primipara or a multipara. Unfortunately it is generally the rule that our attention is first directed to the matter by a history of premature or of still births, and further inquiry is then made. I will now briefly refer to these various cases and merely state the treatment to be adopted.

In cases where the husband has recently become infected with syphilis the wife, if pregnant, and the husband should both be submitted to energetic antisyphilitic treatment. I advise this in all cases, even when the wife is free from any syphilitic symptoms, and it is the more necessary when she shows syphilitic symptoms. It is evident that the wife should also be treated when after conception she has become syphilitic. In cases where many miscarriages and the death of children make us suspect syphilis, we should look for signs of syphilis with tact and caution, and should begin energetic antisyphilitic treatment of both parents, even though all signs and symptoms of syphilis are absent. The good results of this will be obvious in the children subsequently born. Antisyphilitic treatment when carefully carried out may be looked upon as almost free from any possible ill effect,

and should be used without hesitation in these cases, seeing the good results which follow its use.

Another question in the preventive treatment of syphilis is whether a child born of syphilitic parents, and which is apparently quite healthy, should be at once treated with mercury, or not till symptoms of syphilis become manifest. Here too we must distinguish between several possibilities: if the child is born free from syphilis, and the father has had syphilis but the mother has shown no symptoms of syphilis during the pregnancy, we can postpone treatment of the child because it does not follow that such children will be syphilitic. The same holds good when the mother has previously shown signs of syphilis but has remained quite free from them during this particular pregnancy: the child often escapes infection in such cases. On the other hand we must not postpone preventive antisyphilitic treatment when the mother has shown fresh signs of syphilis during this particular pregnancy, or when she has become primarily infected with syphilis during the pregnancy.

As to the feeding of a child which has or is suspected of having congenital syphilis—we must, considering the serious disease which is present or may appear, endeavour to secure the most favourable conditions possible; breast-feeding should therefore be advised whenever possible. It is obvious that the infant may only have the breast of its own mother, and I consider it to be unjustifiable to ask a wet nurse to undertake such a case, even when she fully understands the circumstances and is highly remunerated. The want of intelligence in such people does not enable them to estimate correctly the extent of the risk which they run, and apart from this fact, the physician cannot conscientiously make use of the favourable pecuniary circumstances of a family in this immoral way—in short, I feel I cannot take up too decided an attitude against such a proceeding. When physical exhaustion or marked anaemia, deficiency of milk, or severe syphilitic lesions prevent the mother from nursing her child, we must resort to artificial feeding, regardless of the fact that this is not a favourable course for a child with hereditary syphilis. An

occasional exception to Colles' law has here and there been known, and the mother does therefore run a slight risk by suckling her syphilitic child and may contract a primary hard sore. But such exceptions are very rare, and no weight should be attached to this slight risk which a mother may be expected to run for her own child.

An infant suffering from congenital syphilis is as dangerous to its entourage as is anyone who is suffering from acquired syphilis, and similar precautions must be taken against the spread of the disease; and I have nothing to add to this statement. Cases have occurred in which a syphilitic child is breast-fed by a healthy wet nurse, when syphilis was not known or was not suspected to exist till syphilitic symptoms made their appearance a few weeks after birth. Such cases are not rare, and I consider that the only proper course to adopt is at once to remove the child from the breast, to put the wet nurse under careful observation for at least six weeks, and to treat her by inunction at the very first appearance of symptoms. If the nurse declines to submit to this quarantine, it is the duty of the physician to explain what may be the possible result.

In concluding this subject I will add a few words about syphilis acquired during the suckling period. Infection takes place generally by feeding either from a wet nurse who was not thoroughly examined, or from the use of a teat or spoon previously used by a syphilitic child, or from the mother infecting the milk or the cup by tasting the milk when suffering from some syphilitic lesions of the mouth. The prevention of such infection is by a careful physical examination of the nurse, careful inquiry into her previous health and history, and whenever possible an inspection of her child; we should never rely upon the medical certificate brought from a registry office, but should examine the nurse, because only then can we assume the responsibility. The authorities have also an important duty to perform, and this occupation of going out to nurse should be strictly watched, because evils frequently arise out of it, and any breach of the law should be severely punished. How to prevent infection by the other ways

just mentioned is obvious: I need only say that tasting the milk should be forbidden, for the temperature of the milk can be estimated in other ways, and there is also the possibility that other infective processes may be conveyed by tasting the milk. The risk of infection by spoon, sponge and washing apparatus has already been mentioned: in this respect a child suffering from syphilis must be treated exactly as one would treat a child suffering from a contagious disease. Infection by the genitals need scarcely be taken into consideration at that tender age, but sleeping in the bed with an affected person should be forbidden; this bad habit is not uncommon among the lower classes. Lastly, it should be remembered that infection is conveyed by kissing, and I must not let this opportunity pass without uttering my emphatic protest against this widespread bad habit. The physician should advise the parents to refuse politely but emphatically to allow the infant to be kissed when it is brought out to be shown.

A second chronic infective disease, which may be acquired through the placenta but more frequently appears during the early weeks of life, is tuberculosis, and I will devote a few lines to the preventive treatment of this during infancy. The contention long waged as to the possibility of the direct conveyance of Koch's bacillus from the maternal to the foetal circulation has now been definitely settled by a number of observations; nevertheless such transmission is extremely rare, and we are powerless to do anything by treatment to prevent it. It is different in the case of tuberculosis acquired after birth, and much can be done even at that tender age to lessen the dangers of infection. by the modern methods of isolation and the reception of phthisical patients into special institutions, and other similar preventive measures. The pendulum seems to me to be swinging too far again in one direction, as happened before, when the communication of the discovery of the exciting cause of tuberculosis was first made, and the theory as to infection, which was formerly kept within reasonable limits, now occupies the field, while the well founded teaching about a tubercular disposition, proved to be correct by

innumerable observations made on tuberculous families, has passed altogether into the background. We welcome it as a step in advance in public and private hygiene, that the laxity which formerly existed in connexion with the disposal of tuberculous products has been removed, as a result of the very useful researches of Cornet and Flügge, which showed that prevailing ideas were in part erroneous; but it must be pointed out that we are apt to expect too much from these precautionary measures.

A bodily condition which affords a favourable soil for the bacillus plays at least as important a rôle in the genesis of tuberculosis as does the exciting cause itself, and under certain circumstances an individual thus predisposed will develop tuberculosis, while for others who are not thus predisposed there exists not the least danger. The fight against tuberculosis is not only to be waged against the infection, but also against the tuberculous disposition, and to ensure success must include hygienic rules for the bringing up of children and for diet.

An infant generally acquires tuberculosis in one of two ways, by the digestive or by the respiratory tract, and may suffer from gastro-intestinal or pulmonary tuberculosis. The former can only arise from artificial feeding, at least I know of no authentic case where tuberculosis was acquired through the milk of the mother or of a wet nurse. Diagnostic tests with tuberculin, now regularly carried out, have convinced us that there is much bovine tuberculosis among milch cows, and there are many examples of the conveyance of tuberculosis in this way. To prevent infection, the milk given to the child should come from cows which have been proved by the tuberculin test to be free from bovine tuberculosis; the milk should be boiled and never used either unboiled or heated below boiling point. Infection through the respiratory tract is derived from pulmonary phthisis in the mother or father or in both. When speaking about suckling tuberculosis in the mother was named among the contra-indications, and I must emphasize this again here. If circumstances permit a wet nurse should be procured, because the many digestive dis-

turbances produced by artificial feeding pave the way in such children for the development of tuberculosis. The child is infected directly by the act of coughing when moist particles containing bacilli get into the nose or mouth of the child, or it may be infected by germs carried to it in the act of kissing, or during some of the many attentions which are bestowed upon it. Finally bacilli which get into the dust of the room from dried sputum may infect the child. Preventive measures should be directed against all these sources of infection. Parents should be advised to do as little as possible themselves for the child, and should allow others to attend to it; their sputum should be received into a cloth which is put at once into corrosive sublimate solution and then thoroughly washed in a separate vessel. In this way we can best prevent infection by small moist particles or by dried sputum.

Frequent washing of the hands, no kissing, no tasting of the food or blowing it, are further precautions which should be observed. Heubner has recently recommended the establishment of special homes for the children of tuberculous parents: these are very suitable for such cases; the child is thereby removed from the source of infection, and fresh air and good feeding will tend to prevent the development of a tuberculous predisposition. There is unfortunately great difficulty in diagnosing tuberculosis in these very young children, and isolation of all children who are attacked is therefore not possible. At this age tuberculosis generally assumes a form which is unaccompanied by any external tuberculous secretion, or at most the bacilli are expelled with the faeces, and a thorough disinfection of the napkins reduces the danger of infection to a minimum for the inmates of the sick room or for the persons around the sick child.

The influence of certain infectious diseases upon the incidence or manifestation of a hitherto latent tuberculosis, the measures which may be taken to prevent it, and the preventive measures against scrofula, which usually appears only after the lactation period, will be referred to later.

From these chronic infectious diseases I pass to rickets, a constitutional malady which is very common during childhood. The first symptoms often begin shortly after birth, but more often during the second halfyear of life, and preventive measures are most effectual during this period. So far we have been concerned with processes whose nature is fairly clear and whose predisposing and exciting causes are largely known, but now we are concerned with an affection whose aetiology is still quite obscure, in spite of much work that has been done in this direction. If we have the courage frankly to admit the fact and not confine ourselves to mere assumptions, or believe that we have reached the bottom of the matter when we have only considered this or that factor, then it will be acknowledged that the prevention of rickets is one of the most difficult problems that confront us. Different authorities have variously ascribed the primary cause of rickets to improper feeding, to unsuitable homes, or to some infectious condition, but a very large experience has convinced me that these factors influence to some extent the severity of the disease and the rachitic manifestations, but are not the cause of the disease itself. Many newborn infants show unmistakable signs of rickets, such as general enlargement of the ends of the costal cartilages, defects in the ossification of the bones of the skull, curved tibiæ and a protuberant abdomen. This would seem to be against the influence of the above-named factors and suggests some hereditary cause, particularly as the parents, more especially the mothers, of such children show signs of former rickets. Rickets is almost unknown in some countries where infants are badly fed and are in unsuitable homes, while in neighbouring districts where the social and material conditions are far better for the infant rickets is very common. I may instance North Italy with its special hospitals for rickets, and South Italy where rickets is scarcely known. These facts do not support the theory that it is due to diet or to insanitary surroundings. In Germany some 90 to 95 per cent. of the children suffer from rickets at some time or other of their lives, and the disease is met with in breast-fed children as well as in artificially fed children, in the palatial

homes of the rich as well as in the hovels of the poor. I confess that amid favourable conditions of life the percentage of cases is lower and rickets occurs in a less severe form, but experience has also convinced me that in spite of the greatest care in diet, and in spite of living in fresh air, symptoms of rickets have appeared, generally at the beginning of the second halfyear of life. Personally therefore I am of opinion that the above-named factors affect the severity of the disease but are not its cause. Some time ago I ventured to suggest the opinion that rickets is a racial disease. I was not able to offer evidence in proof of this view, and in Bohemia, where two races of people live side by side, both suffer from rickets. But I made the suggestion as the result of what has been said above about the geographical distribution of rickets and the inadequate causes to which rickets is ascribed. I have referred to this matter here, that on the one hand I might give reasons why I regard our preventive measures against rickets as somewhat ineffectual, and on the other hand to combat statements made as to the sure results of this or of that method of treatment. It is indeed evident that when the child's diet and other conditions of life are improved, its whole organism is fortified and rendered less liable to be attacked by any disease, and I would for that reason always advocate such general preventive treatment, though I could not undertake to say that such a child fed at the mother's breast is immune against rickets, because I am almost daily convinced of the contrary.

Though little can be done to prevent rickets, yet the complications can be prevented by suitable treatment. I cannot refrain in this place from speaking about phosphorus, especially of phosphorated cod liver oil, which is not very highly valued at the present time. Though theoretically its action is doubtful, and though possibly it only attacks the rarefaction of the bones and leaves untouched the essential rachitic changes, yet its effect in a very large proportion of cases is excellent, indeed its effect upon the severe nervous symptoms of this disease might almost be termed magical, and I should not like to be

without this drug. By giving phosphorus we can in a comparatively short time prevent those complications which are to be feared, complications affecting the respiratory and digestive organs, the blood-building structures and central nervous system, and in this respect phosphorus is a most valuable prophylactic. To sum up briefly, I would first endeavour to modify the future attack of rickets by suitable diet and mode of life, and at the first sign of rickets would begin this phosphorus treatment, provided that the drug is well borne by the infant, and this is mostly the case in infants, though not invariably. One word about institutions for sea baths and brine baths, so many of which have been established in recent years, and have been said to give excellent results. They certainly are of some value, because the methods there carried out tend to check the progress of the rachitic process, and cause a rapid consolidation of the osseous structures, and thus counteract the extensive curvatures so frequently met with. And in this way they are a valuable addition to treatment by phosphorus.

Acute infective diseases will be described in a later chapter. They are not common during infancy. The child is less often exposed to infection during this period of life, and there are therefore no special preventive measures against these diseases at this age. It remains for me to consider a few disorders which may possibly be prevented by suitable measures. Mastitis in infants is the most important of these: it is often met with during the first weeks of life, and deserves special notice, not only because it is a painful disorder which may become the starting point of a general infection, but also because it may lead to partial destruction of the mammary gland, which in girls is so important an organ later in connexion with maternal functions. A firm stand should be taken against the custom of squeezing the infant's breast: this is a practice which fails to accomplish its object and remove the secretion; on the contrary it increases the secretion by the mechanical irritation, and at the same time exposes the infant to the danger of infection by dirty hands, from the

adjacent skin, or from secretion which has been squeezed out and covers the nipple. This infection may give rise to deep-seated suppurative inflammation of the breast which never occurs when the breasts have been left untouched, covered only by a dry or wet dressing. When there is a mammary abscess it is important as a prophylactic measure, especially in girls, that the abscess should be opened by an incision parallel with the mammary ducts, that is by an incision radiating from the nipple, to avoid a transverse division of the lactiferous ducts which might lead to the formation of cysts.

The other infections which may proceed from the skin and its glands and their prevention have already been mentioned. I have still to consider a few affections of the mouth in connexion with the digestive organs. Psoriasis linguae is a very trivial affection, probably never giving rise to serious disturbances, and I can dismiss it in a few words. My personal impression is that this condition is never met with except in children fed with the bottle or using one indiarubber teat for a long time. I have never been able to confirm the statement made of a relation between this affection and tuberculosis. We cannot too strongly condemn the use of rubber teats to soothe babies. When we remember that these indiarubber teats are generally first moistened by the mother with her own saliva, and then put into the child's mouth, it is really astonishing that affections of the infant's mouth are not more common. This harmful custom is one of the most widespread in the nursery, and it is comparatively easy to do away with.

Aphthous stomatitis is an affection against which preventive measures are most effectual. Its connexion with foot and mouth disease of cattle is maintained by many. and though not definitely established yet it is advisable not to use the milk of cows affected with this disease, and on the other hand to boil the milk thoroughly and thus destroy any germs of this disease which may have got into the milk. Further, the infant affected with aphthous stomatitis should be isolated, and all articles used by it should be carefully disinfected. Lastly, the

affection should be promptly and energetically treated to prevent the injurious effects of complications, such as diseases of the eyes and of the lungs, which are serious and may be prevented.

The same is true of ulcerative stomatitis, which may be a primary affection caused by infection of the mouth with the cocci of pus, and may thence spread to the skin, or it may be a secondary affection conveyed to the mouth by the infant's fingers, from impetigo of the face or of some other part of the body. Prompt measures should be taken to prevent the spread of such an impetiginous dermatitis. An endeavour must be made to prevent the infant from scratching the eruption and infecting its fingers; and conversely, when the affection begins in the mouth, we must prevent its extending to the skin and must heal it promptly.

Finally, in this chapter I must mention certain manipulations which in unskilled hands and with unsuitable instruments may cause injury. I refer to enemata. It is a very bad custom which prompts the nurse to show her skill by giving at once an enema, though there be no indication for it. Often she uses an unsuitable instrument or one which is not free from danger, and preventive treatment which covers the entire range of the disease of children must guard too against injuries which may be thus produced. Ulceration, haemorrhage, fissures, even intussusception, may be produced, and it should be a rule that no enema be given except when prescribed by the doctor, and he should superintend the giving of the first enema and should see that the instrument does not consist of a syringe with a hard nozzle, but merely of a tube, a tap and a soft rubber catheter, which can inflict no injury nor allow of any force being used.

Certain affections of the respiratory tract in this period of life require special treatment, partly because of their special significance and partly that they may be prevented. Coryza is the chief of these, quite a trivial affection in older children but serious in the sucking infant, for it is a hindrance to sucking, as the nasal cavities are blocked and breathing interfered with, and it may also be the starting

point of infections which pass down the respiratory tract. Infectious catarrhs caused by mechanical irritation of the nose with septic objects have already been mentioned, and the method to be adopted in cleaning the infant's nose was described. It still remains for me to refer to "catching cold" and to say a few words about it. It would be a mistake to begin to harden the body at this period of life, as some would have us do. The great hyperaemia of the skin in the first weeks of life, the inability to regulate the heat formation and the very small amount of movement make the infant very susceptible to all sudden changes of temperature and often are followed by violent and quite unexpected reaction. One natural result of this is that we protect the infant very carefully from "taking cold" and from unfavourable conditions of the weather; do not allow it to be carried out except on fine and still days when there is no wind, and do not let it be too long out of doors; do not have it covered over in the summer, nor allow the temperature of the room to rise too high or fall too low. The heat of the bath water is checked by a thermometer, and is only gradually lowered during the later months of the period of infancy. These precautions generally suffice to prevent colds with their serious sequelae in infants. If the infant has a cold very great care and good nursing are needed to prevent bronchitis and broncho-pneumonia, which are very dangerous conditions in the infant and readily follow the cold. The transition between the simple cold and these conditions is often hardly noticeable, and the slightest neglect may give rise to bronchitis. We must utter a warning then against these colds, and every cold must be regarded as serious in the first months of life. The infant should be kept in the room till the cold has quite gone, and should be most carefully shielded from taking any fresh cold even indoors.

What has been said about coryza applies still more to bronchitis, which even in its mildest form, and limited to the larger bronchial tubes, is a serious and very troublesome affection demanding the greatest attention. Most cases of broncho-pneumonia which seem to be simple are

really the result of neglected catarrh of the air passages, and might be prevented by proper care. Additional precautions are required in institutions where the disease assumes a very infectious character from the crowding of sick children in badly ventilated rooms, and where the poison increases in intensity as it passes from child to child. The isolation of such cases and careful disinfection are required, the principles of which have already been given. As a further precaution which should not be neglected, an infant suffering from coryza and bronchitis should not be bathed too soon, as this is apt to aggravate the condition. Secondary pneumonias and their prevention have already been mentioned in so far as they arise during infancy. True croupous pneumonia is comparatively rare during this period of life, and we can do but little to prevent it except by the precautions which should be taken in institutions against any danger of infection, to which reference has already several times been made.

In conclusion I must briefly mention preventive measures against the ill effects of certain operations undertaken for cosmetic reasons or as religious rites. I mean the piercing of the ears of girls and the ritual circumcision of Jews. The vanity of the female sex does not permit us to do away with ear piercing, but it should at least be done with greater antiseptic precautions than is generally the case. The needles used should be thoroughly disinfected, for it is often very difficult to clean the instrument which is used, and the silk should be boiled or soaked in an antiseptic, so that the obstinate eczema, inflammation and even erysipelas spreading from the pierced spot may be of less frequent occurrence. Apart from the inconvenience and risk of these complications, they may render the operation of no effect. It would be wisest to postpone piercing the ears till girls are older; they will then experience the pain of this operation undertaken to satisfy their vanity, and it will also be possible to do the operation more aseptically. Ritual circumcision is a sad remnant of a fanaticism of past ages; it was sanctioned also as a hygienic measure in the tropics and amid the want of cleanliness of oriental

peoples; but this necessity no longer exists, and one ought to have courage to do away altogether with this barbarous and often dangerous operation. In the instruments employed and in the operation as it is performed by the layman, no regard is paid to the modern methods of the treatment of wounds; and apart from this there are other dangers arising at this tender age from a wound which is not covered by a dressing and is exposed to the neighbouring secretions. In several cases I have seen a fatal result from haemorrhage and from erysipelas which started from the preputial wound, and the custom, which is not common in Germany, of sucking the wound and sprinkling it with wine held in the mouth, may introduce into the infant's body septic germs and even the germs of syphilis and of tuberculosis, as has been recorded in literature. The belief that this operation is a preventive measure against phimosis and balanitis, and also later against venereal infection, cannot be seriously entertained. The number of cases of these diseases is always relatively small, and they are very amenable to careful treatment and aseptic precautions. Another objection is that the results of the operation performed for ritual reasons often need subsequent surgical treatment, and lastly, the numerous cases of genital infection in Jewish youths show plainly enough that the mutilation has been useless in protecting against venereal infection.

I now turn to—

PREVENTIVE TREATMENT IN EARLY CHILDHOOD

In the introductory remarks when I sketched the plan to be followed in these pages, I pointed out that other causes play a part in the diseases common to this period of life, and as instances I enumerated the changed diet and way of life of children, their greater independence, their intercourse with playmates, and their frequent contact with the ground. Up to this age preventive treatment was directed mainly against digestive troubles and all else seemed to fall into the background, but now prophylaxis has to face a group of maladies which we include under the

term of acute infectious disease, and their prevention is an important duty for the physician. The rapid growth of organs favours the reception of infective germs at certain parts of the body and requires other preventive measures. Games; animal and vegetable parasites in the soil, in certain kinds of food and in drinking water; fruit, sweets and confectionery which are not always quite wholesome—all these factors must not be underrated and require careful consideration. During the later years of this period of childhood the child begins to go to school, and is exposed there chiefly to the risk of catching contagious diseases and therefore special precautions have to be taken. These infectious diseases are the most serious and the most common, and I will therefore commence by speaking of their prevention.

Scarlatina.—The measures required to be taken against the infectious diseases to prevent their spread, are determined by several factors. First, we must be clear about the way in which the infection is conveyed, and secondly about the period during which infection may be transmitted. It is most important to determine the diagnosis as early as possible, because experience has shown that many of these affections are less infective in the initial stages than in their later stages. Further, it is desirable that we should be able to recognize the specific organism, the presence of which in the dwelling room of the sick child or on the articles used by the child may help us to ascertain the source of infection and enable us to judge when infection is at an end. Unfortunately some of these postulates are still impossible, others presuppose a special training, possessed indeed by the experienced physician but not by the parents under whose observation the children generally are at the commencement of the illness. Insufficient medical supervision of schools, on the other hand, often makes it possible for a child to continue to associate with the other children of that school, though already suffering for one or more days from well marked premonitory signs of an infective disease. The want of sufficient strictness in seeing that such infectious diseases are at once notified,

and the endeavours made to elude this notification by certain classes of the population, lead to serious consequences, and I will give a few examples of everyday life. A milkman, regardless of the fact that several of his children are suffering from an eruption with fever, continues to serve his customers without taking any precautions; he fills the milk-can in his house, attends to some small want of his sick children, and then, without washing his hands, goes on with his occupation as milkman. Then, again, washerwomen take in washing which they wash in their infected houses, and, without changing their clothes, or in any way cleaning themselves, go into other houses to deliver the washing. Another frequent source of infection is the general provision shop, where, in the room behind the shop, children with some infectious disease may be nursed, and when the shop door opens, the shopkeeper comes out from the sick room and, with hands unwashed, proceeds to sell bread, fruit, or vegetables to the customer. I have selected these few examples, though in our daily life there are many others. The knowledge of these is important, and we should not be content with strict care in the notification of these cases, and with the disinfectant measures prescribed by the law, but in every case which cannot be explained, and where the child has not come into contact with other children, we should prosecute the search for the cause, because only in this way is it possible to remove it. In former years children's hospitals suffered much from infection in the hospital, for children who were taken thither for some other illness often sickened and developed an acute exanthem, or, if admitted for one infectious disease, contracted another. Now, however, rooms for doubtful cases are provided, a careful inspection of the children brought up to the hospital is made, and the immediate separation of those showing suspicious symptoms is effected.

Separate isolation pavilions for the various diseases here under consideration have been built, and the patients and staff isolated from the remainder of the institution. These precautions have reduced the danger to a minimum and have proved how much can be done by such measures. It

is obviously, too, the duty of every physician in private practice to take precautions so that he may not be the means of conveying any infectious disease; the order of the visits to his patients should be suitably arranged. Similar infectious cases should be visited in succession, and infectious patients should generally be seen at the end of his round; his hands should be thoroughly disinfected both before and after his examination of each patient; he should put on a linen overall which reaches down to his boots and is kept ready for him in the anteroom—or when this is impossible, he should take off his coat and hang it up outside the sick room, and should afterwards change his clothes before continuing his daily round—and, finally, he should avoid touching the little patient more than is necessary. All these precautions can be carried out very easily and will considerably diminish the risk of infection being conveyed by the doctor. Having mentioned these general rules, I pass on to consider special preventive measures against scarlatina.

The diagnosis of scarlatina in its initial stage is not easy: generally the child sickens suddenly with high fever and vomiting, and these symptoms should make us suspect scarlatina and keep the patient isolated. Yet there are cases in which the initial symptoms are very slight and are overlooked by the parents, and the physician is only called in when the scarlet fever is already fully developed. And, lastly, there are cases in which the symptoms are so slight that the disease is not recognized by those around the child, and the child is allowed to go out and even to school. Let us suppose a favourable case in which medical help is called in at the very earliest symptoms. We should at once proceed to examine the throat, for this should never be omitted in a child, and see whether a rash is present and the tonsils swollen. If there is a possibility of the disease being scarlatina, the child should be isolated. My experience proves that this course will always save the brothers and sisters from becoming infected at the initial stage, and careful antiseptic precautions will protect them from later

careful antiseptic precautions will protect them from later infection. In less favourable cases where medical aid is not sought till the exanthem is developed, immediate separation of the other children from the patient will often prevent infection and should therefore at once be carried out, and when lack of room in the house does not permit this, the child should be transferred to a fever hospital. The safest way of all is to remove the healthy children from the house and place them with other families where there are no children. When this cannot well be done, it is best to wait till the incubation period is over before deciding to send the brothers and sisters to another house, otherwise there is the danger of infection being carried. In a large house where it is possible completely to cut off all communication between the sick room and the rest of the house, we may carry this isolation out at home, but we must always bear in mind that it is after all but a half measure, as all parents do not possess sufficient self control to keep away for weeks from their other children who are living under the same roof; yet this complete isolation of the mother who is nursing the sick child is absolutely essential. The father may possibly be allowed to go into the sick room if he puts on an overall in an anteroom away from the other children, and then before returning very carefully cleanses his face and hands in a separate room. I have already enumerated the precautions to be taken by the physician, and it only remains for me to describe the precautions to be observed with the other children and their schools. When these children remain in the same house as the sick child, they should be kept away from school and not allowed to return till the illness is over and the rooms have been thoroughly disinfected. When the brothers and sisters, after a bath and the disinfection of their clothes and belongings, have been sent to another house, they should be kept away from school for the extreme incubation limit, namely about twelve days: they may afterwards return to school provided they do not in any way come into contact with any of the surroundings of the sick child, and only see their father according to the rules laid down. The physician should see the children before he gives leave for

them to return to school. Those mild cases of scarlatina which run their course with scarcely a symptom and very slight rash are very unfavourable cases so far as the conveyance of infection is concerned, and for several days or during the whole of the illness the child gets about and may spread the infection over wide areas. We are powerless to do anything in such cases, especially among certain classes of the population, and the only way in which the disease can be prevented from spreading in schools through such cases would be to appoint physicians to the schools. This important prophylactic measure has already been too long delayed to the injury of the children.

Lastly I must mention forms of scarlatina known as scarlatina without eruption, which are not uncommon and which present great difficulties in diagnosis. It is generally mistaken for diphtheria which also requires isolation and disinfection, and, as the course of these cases is generally severe, the danger of spreading infection in itself is not great in these abortive cases. Still it is important to arrive at a correct diagnosis and this can usually be done by the aid of bacteriological examination. I should like also here to protest against the proposal made by some physicians, that when a child has a mild attack of scarlatina its brothers and sisters should be allowed to be with the sick child that they may also have a mild attack and thus become immune against scarlatina. Every experienced observer is aware of the uncertainty of this insidious disease and knows that the severest forms may be conveyed by a slight case of the disease; and, further, that one attack does not necessarily protect against a second. There is therefore no justification for such a procedure.

The germ of scarlatina is unfortunately still unknown, and this is to be regretted when we have to decide upon the measures which are effectual for disinfection after scarlatina and the period necessary for isolation. We know however that the sloughing of the throat which so often accompanies scarlatina is the effect of secondary infection by very virulent streptococci, and, further, that these play an important rôle in causing complications.

The question arises, how long is it possible for the infection to be conveyed by the patient, and how long by a third person or by articles which have been used by the patient? There is no doubt that scarlatina is most infectious in the eruptive stage and while the throat and nose are the seat of special inflammation, and that the degree of contagiousness diminishes towards the desquamation period. The statement made in book after book that the disease is spread by letters sent by the scarlatina patient and infected by the scales shed by the skin requires proof. My impression is that the contagion of scarlatina is a fugitive one, and begins to disappear directly the skin peels and the epidermis begins to be regenerated, and that it is then to a great extent harmless. Nevertheless one would not disinfect the room used by the patient until all scales have been completely removed from the skin by frequent and prolonged baths and soap and water, and as we cannot begin to bathe even an uncomplicated case before the fourth week, the disinfection will have to be postponed to about the beginning of the fifth week. The traditional rest in bed for six weeks is unnecessary when the course of the disease is normal, and I shall I think meet with no opposition today when I plead for thorough ventilation of the sick room, a frequent change of body linen and bed linen, which after being used should be put into a solution of corrosive sublimate for twelve to twenty-four hours and should afterwards be separately washed. The hands and face of the child should be washed at least once daily with warm soap and water. Great importance must be attached to the care of the mouth, not only because many of the secondary infections which may proceed from the mouth can thus be considerably limited, but also because we can reduce the contagiousness by washing away the secretion poured out by the mucous membrane of the throat and nose. In every case in which there is any sore throat, we should wash out the mouth several times a day according to the severity of the affection, using plenty of lukewarm boiled water or a mild antiseptic and passing

part of the fluid through the nose to remove any secretion which is there. Personally I attach little value to injections of carbolic acid into the tonsils; it is very difficult to do when the doctor is alone or has only the help of the mother, and moreover children are so very susceptible to carbolic acid that I prefer to avoid its use. I attach much more importance to well rubbing the skin during the entire course of the disease and especially during the desquamation period with fat, using some pure form of fat which will not undergo decomposition: in this way we can best prevent the flakes of peeling skin being scattered in the form of dust. When the time has arrived for the disinfection of the rooms, one room should be first disinfected and prepared to receive the convalescent patient and his new or thoroughly cleansed clothes. The bedding must be exposed to the action of steam, and in every large town there are special places where this is done; carpets and curtains which were in the sick room should be cleaned by the same process; the floor and walls should be washed, and for this purpose I use a solution of corrosive sublimate of one in 1,000. Toys, picture books, vessels for eating and drinking which have been used by the patient should be destroyed; cupboards should be opened wide, their contents spread out in the room, and all be then exposed for twenty-four hours to the vapour of formaldehyde. Since Schlossmann and Flügge have both stated that formaldehyde at a dry heat becomes altered, I have now for about eighteen months used steam at the same time, which is produced by a kettle of water heated by a spirit lamp and placed beside the disinfecting apparatus. The rest of the rooms should then be disinfected, the anteroom and the kitchen, and for these a steaming for about six hours suffices. When these precautions have been taken, in no case of mine have any of the brothers and sisters taken the infection on their return home, and it has always fortunately been possible for me by adopting the preventive measures described above and by isolation of the sick room to limit the disease to the child attacked.

I have still to mention the preventive treatment of the

complications which occupy an important place in the pathology of scarlatina. The frequent and thorough cleansing of the mouth and nose, as also of the skin, has been mentioned; the same careful treatment is necessary for the genital organs, especially in girls, for they not rarely become the seat of catarrhal processes and even of noma. Other points belong rather to the field of therapeutics proper and do not fall within the scope of this work, and I will therefore add only a few words as to the preventive treatment of the nephritis. It is too optimistic to believe that it is always possible to prevent nephritis by strict milk diet combined with rest in bed; the frequency of renal complication depends very much more upon the character of any given epidemic than upon what the patient does after the eruption has passed away, and I have often seen no nephritis develop in children of the lower classes who were sent out into the open air directly the fever had ceased and who were given a mixed diet, while it developed in other children who were kept in bed at a uniform temperature and were placed on a strict milk diet. I do not mean that milk diet and a plentiful supply of non-stimulating liquids are valueless, for I am convinced that even where nephritis eventually supervenes, it runs a milder course when this prophylactic régime is carried out than when such precautions are omitted, but I would not place too great reliance upon them, and often they are very difficult to carry out on account of the child's aversion to them. In severe cases with threatened heart failure, small pulse and other serious symptoms, fear of an impending nephritis need not deter us from giving alcohol and other stimulants temporarily for such symptoms. I have often given alcohol without any subsequent injurious effect upon the kidneys. It is not necessary, I think, to explain that special and careful nursing and food are required during convalescence from scarlatina, and that care must be taken that the patient does not catch cold.

Next I pass to the prophylaxis of measles. Its contagion is also unknown, but from the results of clinical experience we can state that it is far more communicable than that of scarla-

tina. The contagiousness of measles is at its maximum during the initial stage of the catarrh of the mucous membranes and the development of the rash; and as it was not possible till recently to make a certain diagnosis at this early stage, epidemics of measles generally spread widely and rapidly, so that we seldom saw a child which had not taken the infection during one or other epidemic. When, in the families of princes, measures were taken to seclude the children and thus keep them from all possibility of contact, they developed the illness later, when the duties of their station in life necessitated their coming into contact with the people. During the various epidemics of measles in Prague—some of them very extensive epidemics which I had the opportunity of observing—I was not once able to prevent the brothers and sisters of the child from contracting the infection however early they were isolated, that is at the commencement of suspicious catarrhal symptoms. By causing the healthy children to be removed from the infected house, I found that I merely took the disease into another house, and came finally to the fatalistic conclusion that I must be content with half measures, and restrict myself to keeping the children away from school, and letting all care be taken when they went out for walks during the twelve or fourteen days of the incubation period, but as I said before I did not succeed in keeping the brothers and sisters free from infection. A few years ago Koplik, an American, pointed out a tolerably certain prodromal sign of measles, namely the appearance of spots, which have been named after him, upon the mucous membrane of the cheek and gums some five or six days before the eruption of the exanthem and before the beginning of the catarrhal symptoms, and it may thus be possible for us to isolate such cases early enough, that is before there is any risk of infection, and in this way we may check the spread of this disease. Since hearing of Koplik's observations I have only seen one slight epidemic of measles, and I can state that I was able in a few cases to isolate the patient early enough, and so prevented the infection from spreading to the brothers and sisters. I attach less value to the prodromal sign given by

Meunier, who states that there is a distinct loss in weight during the incubation stage in children about a week before the eruption appears, although the child seems otherwise well. Apart from the fact that it is not always easy in private practice to obtain this information, though it can be done in hospitals, such variations in weight in children may be due to other causes and are so inconstant that but little value can be attached to them. Koplik's sign, on the other hand, almost constantly appears in measles; it is absent in other infectious diseases, can be readily observed at once even by one who is not very experienced, and the diagnosis can be made by simple inspection of the mouth. I ought to state that so far as my experience of this sign has gone, and it is not yet an extensive experience, there seems to be some prognostic value in this sign, and that the severity of the disease bears a direct relation to the number of spots in the mouth.

Measles is most infectious during the stage of the commencing catarrh and the rash, but it very quickly loses its contagiousness, and in uncomplicated cases danger of infection is over in a few days. The contagion is not so readily conveyed by a third person as it is in other contagious diseases, and I do not believe that the infection is carried in letters, nor do I consider that the toys of the child are any serious source of infection. In most cases infection is through direct contact with a patient suffering from catarrh, apparently a bad cold with some catarrh of the eyes, and only as the epidemic begins to appear do we recognize the nature of the case. From what has been said, it would seem unnecessary to be so strict in the disinfection of the house as after scarlatina. It is sufficient if the bedding is disinfected, the room washed with corrosive sublimate solution, the books and toys thoroughly cleaned, and the sick room well aired; the other rooms should be well cleaned, and after two or three baths the child may be sent to school. The case is otherwise when there has been severe bronchial catarrh giving rise for some time to infectious secretion, which may cling to various parts of the room used by the patient; disinfection should then be carried out in exactly the same way as was described for

scarlatina. The same holds good for broncho-pneumonia complicating measles; the child must be kept away from his companions of the same age, and the house will require thorough disinfection. Physicians and parents and all who have any intercourse with the sick child should observe all the precautions described above. Children who have run the risk of infection should be kept away from school during the incubation period, and we should take care that they do not come into contact with other children when they are out for walks or at games. The complications and after effects of measles depend to some extent upon the character of the affection, nevertheless prophylactic measures in various directions are very efficacious. Owing to the strong tendency to affections of the respiratory mucous membranes cold must be carefully guarded against, and good ventilation of the room provided. An even moderate temperature, a moist atmosphere kept up by a steam kettle, frequent change of the air of the room during which the child should be taken into an adjacent and equally warm room or should merely be well covered up, according to the season of the year, are the best precautions against these complications. It is important to wash out the mouth and nose several times a day, and to change the linen daily or more often if necessary. Great caution is required in deciding when the first bath should be given; young children who seem almost well and have but very little cough are difficult to keep in bed, and we are sometimes in rather too great a hurry in these cases, and bad results follow. I never allow the child to be bathed till the cough has completely ceased for two or three days, and the mucous membrane of the mouth has assumed its normal condition and the skin shows but very slight trace of any pigmentation left by the rash. The room must be warm in which the bath is to be given, the bath water not under 95° F., and the child must be put to bed directly afterward for several hours: it is therefore best to give it in the evening before the child goes to sleep. All these are small but important matters. We must not be in too great a hurry in letting the child go out for the first

time, especially when the season of the year and the weather are unfavourable. The combination of measles with whooping cough is rightly looked upon as grave, especially as epidemics of measles and of whooping cough seem to stand in some close relation to one another, and each of these diseases seems to predispose to infection by the other. The preventive measures will be given under "Whooping Cough," and I would therefore refer the reader to this later section.

Lastly, I have to mention the connexion of measles with tuberculosis, which under certain social conditions and with hereditary predisposition assumes a serious form. I need only in this place point out how often a hitherto latent tuberculosis of the bronchial glands becomes manifest under the influence of measles, and as a prophylactic against it all children suspected of a tendency to tuberculosis should be anxiously guarded from infection, but it is often very difficult in practice. Frequently, too, we see that a patient suffering from measles and living in a phthisical environment develops tuberculosis from patches of broncho-pneumonia. It is exactly for these cases that Heubner's excellent idea is so useful, of providing special homes for children who are predisposed to tuberculosis or who are exposed to the danger of infection from tuberculosis, and in certain special cases we should advise that this should be done, although in ordinary cases of measles we should avoid sending the child to a hospital, knowing that this does not favourably influence the course of measles. It is not my task to describe in detail the preventive measures which should be carried out in the hospital, and I will merely say that the wards for measles should be so arranged that it is possible to isolate patients suffering from pneumonia or from tuberculosis in special well ventilated rooms, and to avoid crowding patients together in large and densely filled wards.

Rubeola (or "German measles") is closely related to measles and is often classed with measles. It differs from measles in the catarrh being absent or slight—the difference upon which most stress must be laid—and in the absence of Koplik's spots, and observations of epidemics of rubeola justify us in regarding this affection as a dis-

ease *sui generis*. Its contagion is unknown, but it appears to be very transient and it possesses its greatest power of infection during the eruptive stage. The small amount of secretion from the mucous membranes makes the period during which there is danger of infection a very short one and the milder measures of disinfection described in the previous paragraph suffice to prevent the spread of German measles. In uncomplicated cases—and rubeola generally runs a simple course—the patient may safely be sent to school ten days after the eruption, after he has had two or three baths. The brothers and sisters should be kept under observation till the incubation period of twelve to fourteen days is passed. Conveyance of the disease by a third person or by utensils used by the patient need scarcely be considered.

For the prevention of smallpox, we have in Jenner's vaccination, as the brilliant results in Germany show, a method which enables us completely to stamp out this devastating and disfiguring disease. It is much to be regretted that all civilized states do not yet enforce compulsory vaccination and revaccination of their inhabitants, and are content often with less strict compulsory vaccination. In Austria a certificate of successful vaccination is required when the child goes to school, and primary vaccination or revaccination of recruits for the army is also compulsory. It is noticeable in these cases that the instinct of the people anticipates the care of the government for them, and physicians, at least in the towns, meet seldom with any opposition to vaccination, but it is rather welcomed. We owe it principally to this fact that even in Austria the number of cases of smallpox steadily decreases, and for years at a time there may be no smallpox to treat. But if smallpox is really to be stamped out by vaccination, then more stringent laws are necessary, non-compliance with which should be severely punished. Every child should be vaccinated in the first year of life, and the vaccination should be repeated at intervals of not more than ten years. Great importance should be attached to this revaccination, as our military results prove the protection against small-

pox lasts only a certain time, and primary vaccination alone is therefore only a half measure.

At the present time we have not yet reached the point when we may pass variola by, and we must therefore briefly consider preventive measures required in the treatment of smallpox. Of the three stages in the course of a smallpox case—the eruptive, the suppurative and the desquamative stage—the latter is by far the most dangerous so far as conveyance of infection to others is concerned; the unknown organized virus shows great power of resistance, and even when dry in the crusts left by the pustules is still virulent for a long period. The desquamative process often lasts for several weeks, and as a preventive measure patients should not be permitted to come in contact with the outer world till all the spots are completely healed and the crusts have been completely destroyed. To hasten the drying up of the vesicles and as far as possible prevent their further extension, baths are used with the addition of some mild antiseptic. The attendants and the physician should be revaccinated, and before leaving the sick room, which should not be entered without previously putting on a linen overall, the hands and face and even the beard should be thoroughly washed with soap, and disinfected with alcohol and sublimate, in order to remove and make innocuous the small scales which may adhere to these parts. It seems to me to be necessary too to take a bath and to change one's clothes before visiting other patients. Utensils used in the sick room should not be carried into other rooms, but should be washed in a place specially set apart for this purpose. We should not omit disinfection of the patient's faeces and urine; for the variolous process is known to affect also the mucous membranes of the intestinal and urogenital tract, and these excretions may also be infectious. Lime is best for this purpose. When the disease is past, the whole house must be rigorously disinfected, all things used by the patient should be destroyed by burning when possible, and the remainder, and bedding, carpets, and curtains, must be disinfected by steam. The furniture should be washed with a solution of corrosive sublimate, the floor

and walls should be likewise washed and afterwards repainted or repapered; special care should be taken to destroy the crusts formed by the pustules, and this is best done by burning. Lastly, the house should be disinfected by formaldehyde with steam, or by glycoformol; it should then be aired for several days, and un-revaccinated inmates should not be permitted to return to the house until they have all been satisfactorily revaccinated.

I have still to mention the cases where a pregnant woman is attacked with smallpox, and the measures required to be taken. When pregnancy is not far advanced expulsion of the ovum generally occurs, but when pregnancy has nearly run its full course there are several possibilities. The child may be born during the incubation period of smallpox, is still susceptible to vaccination but sickens in spite of it—and I can call to mind such a case in the Foundling Hospital where vaccination and smallpox pustules developed side by side; or the child may be born having an eruption of smallpox pustules or remnants of them, and this child is naturally not susceptible to vaccination; or it may in utero have become immune against smallpox and against vaccination without itself having been ill. Nevertheless it is obviously our duty to vaccinate these children directly after birth, and carry out all necessary precautions as mentioned above. Lastly, it may happen that the mother sickens only towards the end of gestation, and that the child is born during the desquamative stage or during the mother's convalescence: in these cases either the child may be immune, as is proved by the fact that vaccination does not take, or the vaccination takes and the infection of the newborn infant may be prevented.

In conclusion, a few words must be said about vaccination, which has become comparatively easy since the use of human lymph has been given up, and the objection to vaccination raised by anti-vaccinators because of its liability to convey syphilis no longer holds good. The soundness of the animals from which the vaccine lymph has been obtained is always tested by an autopsy on the body of the animal, made before the lymph is sent out. In obtaining the lymph

the vaccinated surface is kept clean by dressings, by sterilizing all instruments used for the operation, and by other similar precautions; and freedom from germs in the lymph is secured by the prolonged action of glycerine: as a result there has been a great decrease in the number of cases of infection with microbes, especially with staphylococci. Further rules are that asepsis should be observed when vaccinating; the child's skin should be previously well cleaned with soap and brush, ether or alcohol. A piece of cotton wool should be interposed when blowing out the lymph from the tube, the glass plate upon which it is received should be disinfected, and the instruments should be boiled. When the pustule develops we must cover it with a suitable dressing which should not be discarded till the wound has healed.

Varicella is generally a very trivial affection and the preventive measures against it are simple. The contagion soon loses its virulence and infection is easily prevented. When the pustules have dried up, a few baths with the addition of some mild antiseptic and the use of plenty of soap suffice to render the patient non-infectious. In disinfecting the rooms it is sufficient to use the simplest measures above mentioned. The brothers and sisters should be kept away from school till the incubation period is over, that is for about fourteen days. Certain precautions should be observed in view of complications; the mouth must be kept very clean to prevent infection spreading from the eruption on the mucous membrane, and the urine should be tested in case nephritis should supervene. These are the principal precautions needed. We should avoid sending patients into hospital because experience has shown that varicella may then run a severer course, and gangrene of the pustules and secondary infections arising therefrom make the prognosis far worse. Lastly, I must not omit to mention that we ought to make a correct diagnosis, as much mischief may be caused by mistaking a mild or abortive form of smallpox for chickenpox.

I proceed now to speak of the preventive measures against diphtheria. The discovery of the exciting cause of diphtheria, the Klebs-Löffler bacillus, about the specific action

of which there can be no doubt, has enabled us to demonstrate the existence of the disease, and to devise sure preventive measures. The fact that Behring and his pupils have given us a specific cure for diphtheria, and the possibility of obtaining at least a temporary protection against diphtheritic infection by using this protective serum, are considerations which place our modern preventive treatment of diphtheria upon a strictly scientific basis, and when rightly used it is followed by very good results. We know the great vitality which is possessed by the bacillus of diphtheria and we know that it may be spread not only through contact with the patient but also through the air, by the most diverse objects, such as toys, imperfectly washed fruit, and bread, through soiled hands, and through the secretion of the nose and throat of healthy persons who are apparently immune against diphtheria. We must briefly then consider all these possible sources of infection, and adopt commonsense preventive measures against diphtheria which embrace them all. During epidemics of diphtheria we should avoid getting articles of food from houses in which are patients suffering from diphtheria, and the authorities should not allow the sale of food, and especially of milk and bread, by persons whose children have suffered from diphtheria till after the house and shop have been thoroughly disinfected. There would be great difficulties in such measures, but I am convinced that without them we cannot prevent the spread of diphtheria. It is essential, too, that milk should be boiled directly it is delivered at the house and set aside to cool, bread should be well scraped, fruit should be peeled or cleansed, and vegetables should be thoroughly washed. It is much more difficult to prevent infection by persons who, without themselves being ill, harbour the virulent germs of the disease in the nasal cavity and throat. Often, as in the cases reported by Escherich in which the infection was spread by a nurse, it is by a mere chance that we find the source of the infection, and we must therefore carefully weigh all possibilities and endeavour to arrive at a con-

clusion by the help of bacteriological examinations. The child suffering from diphtheria and all its surroundings, those whose duty it is to nurse the child as well as all things which are used for the child, require very special care. The precautions by way of disinfection which have already been described in detail in previous pages must be strictly observed. It seems to me important that we should make sure by examination of cultures that the disease is of a diphtheritic nature, this being of the greatest importance both as regards the treatment of the disease and the subsequent measures to be taken. I do not deny that there are certain obstacles in the way of introducing this method into general practice, but these must be removed. The brilliant results obtained in places where it is carried out are the best guarantee for the correctness of these statements. Another equally important point is that a child, though convalescent after diphtheria, and this may be in a few days when serum has been early used, harbours virulent diphtheria bacilli for a long time in its throat, though the mucous membrane is apparently normal, and also in its saliva, and in this way infection may be spread. We should therefore, before dispensing with further isolation, examine the mouth of the child for these bacilli, and by gargling with solution of corrosive sublimate, mopping out the throat with this antiseptic, and in other similar ways, endeavour to render innocuous any bacilli which still remain. When for other reasons it is not possible to do this, isolation of the child must be strictly carried out till we are sure that the throat is quite clear, and this often takes several weeks after the exudation has gone. This point is also of the greatest importance in relation to the return of the child to school.

As to the brothers and sisters it is advisable to remove them from the house directly after the illness has declared itself; generally it is possible by this early isolation to keep them from becoming infected, and it is essential that they be kept under observation so that at the very first appearance of symptoms they may be submitted to the serum treatment. When it is impossible to separate

them thus completely from the infected child I inject a small dose of Behring's serum sufficient to render them immune against diphtheria, and in some cases I have followed the same course with the attendants upon the child. In this way we can remove all fear of infection for a few weeks and the sick room can be disinfected. The return to school of the brothers and sisters of the child must be strictly forbidden, especially as the incubation period of diphtheria varies within such wide limits that we cannot definitely state any exact period. Any intercourse of the healthy children with the attendants upon the sick child should be wholly avoided where possible, or should only be allowed when all due precautions are taken: that is, there should be no close contact and the clothes should be changed. Among preventive measures calculated to prevent possible complications I give the foremost place to the early use of the serum. Its use in more than a hundred cases in private practice, some of them in consultation with other physicians, has convinced me that only in this way can we make sure that the disease shall run its course without complications and disturbance. The results in hospitals have been less uniform: they generally do not come under treatment till a much later stage. It is then impossible to neutralize the changes wrought by the bacillus or its toxin. During the last few years I have seen no case complicated with albuminuria or nephritis and no paralysis, and since using this valuable serum there has not been any rash. We should not omit to wash out the throat regularly; appetite returns earlier when this is done and any microbes which would produce secondary infections are best removed by this method. In hospitals where no provision is made for treating diphtheria separately we should adopt preventive inoculation as introduced by Heubner and persuade all patients to undergo the operation; the value of this prophylactic is shown by the total disappearance of infection in the institution.

As in most of the acute infectious diseases, so too in whooping cough, the exciting cause of the disease is still unknown: much work has been done in this field during

recent years but the results have been so contradictory as to be of no value yet for practical purposes. Of the three stages of the disease—the stage of prodromal catarrh, the convulsive stage, and the stage of decline—the first is the most dangerous, not I think because of its greater infectiousness, but because the disease has not yet been diagnosed and close intercourse with other children has not been forbidden. Diagnosis in this initial stage would be of great service in preventing pertussis, and I venture to suggest that we should look with suspicion upon every cough the severity of which is disproportional to the physical signs and which is not relieved by sedatives, and should isolate such children. Though some authorities do not consider the paroxysmal stage to be contagious yet this is surely an error, and I would urge isolation of the patient with whooping cough until complete cessation of the cough. The difficulty of isolation is greatly increased by the fact that we have to do mostly with patients who do not keep to their room or their bed but go out, especially in the fine seasons of the year, against the wish of the physician. Certain special precautions are required that the patient may have open-air treatment and at the same time that the danger of conveying infection to others may be reduced to a minimum. I would recommend that certain parts of parks should be reserved and laid out for such children, that special conveyances should be used to bring patients living at a distance, that parents or attendants accompanying the children—who are often so thoughtless about this matter—should be advised to take the child aside at the approach of a paroxysm of coughing and to see that the expectoration is received into a cloth which can later be thoroughly disinfected, or else that the expectoration is at once covered over by earth. This method is not always practicable, especially when the paroxysms are followed by severe vomiting and the food, mixed with infectious mucus from the larynx, cannot be got rid of so easily; nevertheless much can be done by removing certain bad habits, such as drawing the mucus out of the mouth of the child with the fingers, smearing

it on the clothes, and holding the child up against the body during the paroxysm. Similar precautions should be taken too at the various watering places and summer resorts to which children with whooping cough are taken. And here too it would be advisable to set apart certain places where such patients with their attendants would only be received and where the houses, the walks and the entire arrangements of life could be adapted to the needs of such children. These are very desirable precautions and would most effectually prevent the spread of the disease. In railway travelling special carriages should be set aside for such children and indeed for all persons suffering from contagious diseases; these should be such as can be easily disinfected, and each carriage should be thoroughly cleaned after every journey. Lastly, it should be mentioned that it is best to avoid treating children with whooping cough in institutions on account of the risk run of developing secondary infections. Thorough disinfection of the house in which a case of whooping cough has been is essential. The child should be kept away from school till the cough has completely ceased. As to the brothers and sisters they should be removed from the house, and should not be allowed to go to school unless they have already had whooping cough or until they have had no intercourse whatever with the patient for about a fortnight, this being the incubation period. Children at the breast should also be removed from the house, for although there is certainly some immunity against pertussis in a child who is suckled, yet when it does take the disease it has it in a very severe form which often ends fatally.

Conveyance by a third person is possible, especially through expectoration clinging to clothes or toys or utensils used by the sick child, and it can be prevented by suitable precautions, such as changing the clothes before visiting the other children, thorough cleansing of dishes and vessels used for eating and drinking, and by destruction of the toys at the end of the illness.

A few words must here be said about the prevention of complications which may be very severe even when the

disease has run a mild course. The coincidence of epidemics of pertussis and measles, reference to which has already been made, demands serious attention, because these diseases have a bad influence one on the other and favour the development of tuberculosis. At such times we should therefore exercise extra care to prevent infection. The open-air treatment of pertussis is an additional precaution: every physician knows the fact, though the explanation of it is not yet forthcoming, that the number of paroxysms of whooping cough is far smaller in the open air than indoors. I attribute also to this factor the good results supposed to follow a change into the country, and we should therefore send the children into the open air as much and as long as possible. But we must not forget that these patients are thereby exposed to the risk of taking cold and of developing complications of the respiratory tract which may be very serious. The child should therefore be permitted to be out of doors for long only in the warm season of the year and on dry days when there is no wind, but in autumn and in winter he should only be out in the afternoon when the sun is shining. The advice now often given that the child ill with whooping cough should be carried out in the open air even when the disease is complicated with pneumonia is, I consider, very dangerous.

When speaking about measles I pointed out that measles and whooping were peculiar in that they render a child very susceptible to the infection of tuberculosis, or may render active some latent tendency to tuberculosis, especially of the bronchial glands. Wherever there is an hereditary disposition or whenever there is much risk of infection extra care is required to prevent the tubercle bacilli from gaining a hold. It is best at once to remove the child out of these infected areas, and if tuberculous disease of these glands is already present we must secure the most favourable conditions possible by getting the child into the country and by proper diet, in order to render the attack of whooping cough as mild and as short as possible. In the dieting too we have some prophylactic opportunities:

frequent vomiting reduces the physical strength of the child and makes it less able to resist secondary infections; in these cases, as indeed in all cases of pertussis, the child should have frequent meals, most of them consisting of fluids or gruel; the meals should be taken shortly after a paroxysm of coughing in order that there may be an interval for the partial absorption of food before the next attack.

In the infective diseases which so far have been described, the infection was conveyed chiefly by direct contact or inhalation or through a third person or through some object; but in typhoid fever it is somewhat different: the patient has become infected by eating or by drinking infected substances which contain the specific bacillus, and other modes in which infection may be conveyed are of secondary importance only. Most often the infection is through drinking water made impure by having become mixed with the excreta from a typhoid patient, or through unboiled milk containing the bacillus, through badly washed vegetables or unpeeled fruit. It is only rarely that a person becomes infected directly by the secretions and excretions of the patient. The aetiology is more obscure in those cases where an infant at the mother's breast is attacked with typhoid fever though neither the mother nor the wet nurse has, or has had, the disease. I have several times seen such cases in Prague, which has the evil reputation as a typhoid fever locality. We can only surmise that the bacillus was in the water used for washing the breasts or in the bath water, or that the bacillus reached the finger of the nurse in some way and was conveyed to the child's mouth when the nurse was attending to the child. The preventive measures against such sources of infection are obvious: boiled water alone should be used for washing the breasts or for the child's bath, and the hands should be well washed before touching the child. If there is a case of typhoid fever in the house the patient should be isolated and every care be taken to prevent the infection being conveyed to the infant. If the child is being artificially fed the main point is the thorough boiling of the milk,

and only boiled water should be used to dilute the milk. In the period of early childhood additional measures are required: drinking water, especially in towns where there is much typhoid fever, should always be boiled and filtered or replaced by a mineral water; all food given to the child should previously have been well cleaned, and this is especially the case with fruit, which should be peeled or thoroughly washed. Especially during epidemics one must be careful about children who like to play with earth, and one should prevent the child putting its fingers to its mouth before they have been washed. When the disease is present the chief aim must be to disinfect the faeces and urine to prevent spread of the infection; the excreta should be disinfected by the addition of lime; the linen should be separately washed, having previously been put into a solution of corrosive sublimate; the hands of those who are attending the patient should be carefully cleansed and disinfected with corrosive sublimate, soap, alcohol and ether. By observing these precautions it is generally possible to prevent the brothers and sisters from becoming infected, and with suitable home arrangements they may be allowed to go to school, especially as the very slow development of typhoid fever would make it possible to take them away from school in time.

Among preventive measures we must include the making of a correct diagnosis of typhoid fever and this, as every experienced physician knows, is very difficult at the beginning of the illness. We should therefore avail ourselves of every possible means of diagnosis, make cultures from the faeces and urine, and apply Widal's test: where circumstances do not permit of this being done in the physician's own laboratory, the sanitary authorities should provide facilities which would enable this method of examination to be added to the other methods for the diagnosis of infectious disease. If the State imposes upon the physician the duty of notification of infectious disease it should also on its part place every available method for the diagnosis of disease at his disposal, free of charge and

without taking up much of his time: this is indispensable in the interests both of public and private hygiene.

It is necessary now for me merely to mention the prevention of complications. The mouth must be kept thoroughly clean as it is often the site of numerous bacteria which may excite secondary infections; great care must be given to the care of the skin; the genito-anal region should be kept clean. A large amount of fluid should be given to the patient, and the diet should be ample and such as not to give rise to irritation of the intestinal tract. Great importance should be attached to deciding upon the time when the patient may get up and when solid food may again be given; too great haste may be the cause of much mischief. So far as one can make general rules for these cases, I never allow a patient to get up before the commencement of the second week after the temperature is quite normal. I allow solid food to be given at the same time, and a week later I permit the patient to go out in the open air in good weather.

Epidemic parotitis, or mumps, runs a very favourable course in childhood, and cases complicated with orchitis are much more rare than in adults. This consideration induces some authorities to suggest that measures should not be taken to prevent children from acquiring this infection, because infection during childhood will render them immune against infection later in life when the disease runs a more severe course. When speaking of scarlatina I pointed out that we are not justified in adopting this course, and for mumps I would similarly urge the isolation of the patient, the disinfection of all articles used by the patient, keeping the patient and his brothers and sisters away from school, and thorough disinfection of the house when the disease is over. These principles I have already laid down in detail. It should be remembered that the infectiousness of mumps begins with the prodromal stage and lasts during the whole course of the disease, and the incubation period extends over two or three weeks.

During the last ten years Europe has repeatedly been

visited by widespread and in parts by very severe forms of influenza. It may attack children during all periods of child life, and its very rapid spread and infectiousness make its prevention a difficult task.

It is a very difficult matter, especially in cases where the mother or wet nurse has influenza; taking the child from the breast does not save it from infection, and on the other hand exposes the infant to the risks run by changing its food, and many an infant has succumbed. From the experience gained in the three epidemics of influenza which have visited Prague since 1890, I am of opinion that isolation of the patient is of very little value; it is generally not possible to isolate these cases till too late, and the disease spreads so rapidly and by so many ways over whole towns and regions that it is quite impossible to attack them all, and it is better to look on with a certain fatalism. At all events I do not advise that children should be sent away from the infected house, which would only still further spread the malady, neither do I advise that a change should be made in the feeding of an infant at the breast unless the disease is running so severe a course as to influence unfavourably the secretion of milk. It appears to me to be of much greater importance to prevent secondary infections proceeding from the mouth and nose, and most of these are caused by streptococci. These infections are often seen in children, and they are of bad prognosis, whereas the prognosis of the disease itself is good. Regular washing out of the throat and nose with lukewarm boracic acid solution seems best to prevent these infections. Large numbers of people are attacked at a time, and it seems therefore advisable in the case of school children that the school should be closed to prevent at least this source of spread of infection. I am not able to say whether disinfection of the room or rooms in which the patient has been is of any value; the attempt might be made. I did not myself make it, because in the families to which I was called all the members generally sickened in such rapid succession that subsequent disinfection of the house appeared unnecessary.

My experience in miliaria is limited, and extends only to a slight epidemic which occurred in an outlying district of Prague. The infectious nature of these cases was but slight: isolation of the patient in one room sufficed to prevent the brothers and sisters from becoming infected, and disinfection of the sick room sufficed to destroy the apparently short-lived germs. But from communications made by various authorities I gather that in some epidemics of miliaria the disease runs a very severe course and is highly infectious, and in such cases it is obvious that far more stringent preventive measures are required.

Glandular fever was first described by Emil Pfeiffer, but some do not consider it a special disease. I have only seen a few doubtful cases of it, and am therefore not able to give any personal experience in regard to its prevention. Prague, so fertile a soil for the various infectious diseases, does not, judging from the observations of myself and my colleagues, offer a favourable soil for this disease.

Physicians who have had experience with glandular fever state that it is not highly infectious; they recommend that the patient be isolated, and on recovery the throat and nose should be washed out several times, and a few baths containing some antiseptic should be given before the child is permitted to associate with other children.

The remaining diseases comprised in this group are Asiatic cholera and malaria. I have not seen a case of either of these among children, and must refer the reader elsewhere.

Tetanus is an infection which may be met with here and there during the period of infancy and during early childhood. In the former period the infection usually enters by the umbilical wound, and prevention lies in strict asepsis. During early childhood the bacillus usually gets into the body from the earth, and infection is prevented by guarding the child from all dirt and by carefully disinfecting any small injury the child may meet with. When the disease is epidemic, as last year at the Prague Lying-in Institution, it is extremely difficult even by the most

thorough disinfection to get the upper hand of the tetanus bacillus, as may be seen from the fact that after leaving the wards empty for a long time and thorough cleansing of them, sporadic cases nevertheless occurred when they were again used. In such a case, having regard to the doubtful results obtained by treatment with antitoxin, it seems to me best to adopt preventive inoculation of all pregnant patients taken into the institutions and all patients already confined, a method which might also be extended to the children.

Hydrophobia is an infectious disease not very rare in early childhood, and I can remember seeing a number of young children who were patients at the Paris Pasteur Institute in the year 1886. The preventive treatment carried out by Pasteur, which is begun during the incubation period, is now practised in the institutes of preventive medicine in various countries, and is so well known as to need no further description. Another method of prevention is to forbid the child having anything to do with domestic animals, which often are a source of danger too in other ways.

Next I turn to chronic infectious diseases of early childhood and their prevention. Tuberculosis must be first considered. The conditions of infection and the course of the disease are somewhat different at this period of life from those of infancy. In an earlier paragraph relative to tuberculosis I pointed out the dangers which are run when children hereditarily predisposed to tuberculosis and very susceptible to the contagion are allowed to live with their parents who are already phthisical: in such cases it would be best to follow Heubner's suggestion, and put the children into a special institution. This unfortunately often cannot be done, and other preventive measures too against tuberculosis are very difficult to carry out in practice. Often it is absolutely impossible to prevent close intercourse between parents and children: to educate tuberculous patients, and get them to observe due caution in the disposal of their expectoration and to avoid using vessels in common with others for eating and drinking, are tasks

often beyond the power of the physician to accomplish, though their importance is very evident and of special value for those who are scrofulous. At present I see but scant possibilities for such thorough preventive measures, and we shall have for some time to come to be content with removing a part only of these dangers.

I will now briefly describe these measures. Experience teaches us that a large number of children belonging to tuberculous parents have caseation of the bronchial lymphatic glands, the clinical diagnosis of which is not very easy, but which we may assume with tolerable certainty to be present when there is enlargement of many of the cervical glands, especially of those lying along the anterior border of the trapezius, which, as I have often verified by post mortem examinations, are continuous with the chain of infected lymphatic glands in the hilum of the lung. I attach less value to interscapular dulness, or to weak breath-sounds of one lung produced by narrowing of the chief bronchus by pressure upon it of the surrounding lymphatic glands, and the diagnostic aid of tuberculin injection I consider too dangerous for use in children. Some of these children do not develop either a local or a general tuberculosis; in other children the swelling of the lymphatic glands is the result of disease elsewhere, such as chronic intestinal trouble, nevertheless I regard these enlarged glands as a symptom which should make us suspect tuberculosis, especially when there is a family history of tuberculosis and the children show any other signs of the disease. The greatest care is required in these cases.

There are several precautionary measures to be taken: all sources of irritation of the lungs, especially that which follows a cold, should be avoided; the children should be guarded against changes of weather, should be much in the fresh air, and spend the fine months of the year in some healthy district, avoiding however all places frequented by phthisical patients, and selecting a spot where there is sea air or where there are brine baths. The tendency of some infectious diseases, especially of measles or of whooping cough, to bring out a latent tuberculosis,

makes it our duty to guard such children from those diseases which excite tuberculosis. They should therefore be kept away from children's ordinary playgrounds, should be watched when out for a walk, should be guarded from all that would necessitate general intercourse with other children, and should not be sent to school till they are older, because the risks are then fewer, as most children have the infectious diseases in early childhood. Careful diet, excluding all food that might convey tuberculous virus, and care of the physical health are essential. These children are not fit subjects for strong measures in hardening the body. All this is naturally possible only for those in the better circumstances of life; for the poor and wretched the only prospect lies in government help in the future.

Another class of cases which must here be considered contains those in which scrofulous symptoms are present. I will not here enter upon the question of the relation between scrofula and tuberculosis, but merely state that personally I regard scrofula as affording a favourable soil for the development of tuberculosis. It seems to me immaterial whether this is the correct view or whether scrofula is of a directly tuberculous nature. Experience teaches us that with suitable treatment scrofula may be perfectly cured, and that children who have had scrofula may grow perfectly strong in later years, showing not a trace of the former scrofulous diathesis. The susceptibility to tubercular virus disappears when these scrofulous symptoms disappear, and this suggests one line along which preventive treatment may go. The advantage of this treatment is not for the rich alone; and poor people are able to send their children to hospitals which have been established at seaside places through private benevolence. It were to be wished that the government would actively take the matter in hand, as is done in France, because the question is one concerning the health of the rising generation.

It can be shown even in childhood that there exists a close correlation between the heart and the lungs in children

with a tuberculous predisposition, and this suggests another line of preventive treatment which may be followed. I have already said that such children should not be sent to school, this prevents the risk of their infection with infectious diseases, but it is well for other reasons too to keep the child from school. Sitting still for hours at a time, the homework, want of movement, and the faulty position assumed in reading and writing, are conditions which tend to prevent the efficient expansion of the lungs and the effective working of the heart, and these make it still more easy for Koch's bacillus to develop in a body predisposed to tuberculosis. Suitable gymnastic exercises are of value, but should not be begun too early, not till after the sixth year, and should be limited to "free" movements and dumb-bell exercises to increase the size of the thorax and raise the respiratory capacity of the lungs. Thus we possess a number of preventive measures by which one who is apparently likely to die or to become chronically ill may be transformed into an individual capable of taking his part in the battle of life.

As regards syphilis in early childhood, the measures already given when speaking of syphilis acquired in infancy should be adopted. It should be added that sleeping with unknown persons should be forbidden, as is not uncommon among the lower classes; and even at this early age syphilis may be caused by sexual abuse.

Before proceeding to speak of measures required to prevent disease of the various organs of the body, it seems well to say a few words about the care of children and diet at this period of life, so far as this is concerned with the prevention of disease. As to the bath, one should begin towards the later months of infancy to discontinue the daily bath and limit the baths to two a week in the period of early childhood and in winter to one a week. The fact that the child gets about much more necessitates very careful watching of its movements, and all water which is derived from a suspicious source, as is the general case in Prague, should be boiled before being used. The tempera-

ture of the bath in the second year should not be below 85° F., and later, so far as the ordinary bath is concerned, the temperature should be only very gradually reduced, and should not during early childhood be below a minimum of 70° F.

It is otherwise with bathing in the open, and in fine weather particularly at the seaside it is permissible to bathe in water at a lower temperature; but I would not permit children to bathe in the open before the end of the third year, and I would not permit them to learn to swim before they are eight years of age.

This question leads me next to consider the subject of the hardening of the body, about which we are so often asked for advice. I cannot say that I am personally impressed with its advantages, and the course of years has not convinced me that such children show any greater degree of power of resistance to disease. To begin very early with such measures I consider to be a direct disadvantage, and my own opinion is that they should never be begun before the fourth year, should then be very gradually adopted and carried out with common sense. The temperature of the bath should be slowly reduced and the bath may be followed by an application of cool water or a douche. The child may be rubbed down with cold water before going to bed, or if this stimulates the child too much, it may be done after getting up in the morning. Suitable clothing should be provided and the woollen vest and hose may be disused. Certain customs which have arisen from vanity or from lack of understanding, such as wearing short socks in winter and leaving the calves of the leg bare, I consider erroneous and often injurious; and so also on the other hand the coddling of children and the anxious dread of every breath of air and the wearing of much warm clothing may all lead to injurious results. The happy medium is required in all these matters, and Spartan customs should be avoided, for they are not adapted to the climate of Germany with its abrupt changes of temperature.

With regard to the mouth, the treatment should be different to that required in infancy. In the baby the shallow toothless oral cavity with the short alveolar processes, in which

the food (mostly liquid) remains a very short time may, especially under certain conditions previously mentioned, require very special and careful treatment. In childhood regular daily care of the mouth is required. It should be cleansed daily with a soft brush and piece of linen soaked in a weak antiseptic solution, and later it is necessary to gargle with a similar solution after every meal. It seems to me of great importance to accustom the child early to have its throat inspected; this makes it possible at once to recognize any disease which may commence in the throat and makes it also much easier for the physician to examine and treat the throat. The painful struggle with a howling child which has possibly been previously threatened with the "doctor" should be spared us, and the use of force, such as holding the nose till the mouth is opened and using a gag, should be had recourse to only in extremity. The care of the teeth should be commenced with the milk teeth, and as any carious cavity may become the habitat of numerous microbes, it should be stopped to make it harmless. As to the nose, I consider that washing out of it is only necessary when there is some infective process; at other times it is sufficient to wash the easily accessible parts. The same holds good for the ears, which the child likes so much to handle at this age, and which therefore often become affected with inflammations of the external meatus, or stopped up with cerumen or foreign bodies.

We must never omit to inspect and to cleanse the genitals: conditions (especially balanitis and vaginal catarrh) associated with the irritation of itching often produce masturbation which one is almost powerless to remove when once it has developed. Intestinal parasites too, especially threadworms, may wander into the vagina and by mechanical irritation cause pruritus, leucorrhoea and similar conditions, the cause of which may be overlooked. Inspection of these parts is therefore advisable.

In regulating the life of such children we should aim at letting them be out of doors as long as possible when the weather permits, and when they can walk they should be permitted to take plenty of exercise. The amount of walk-

ing permitted to children just learning to walk or to rickety children must be limited. When the child soon tires and cannot run well the chief cause, in my experience, is to be found in flat foot caused by rickets and generally combined with genu valgum. When we have convinced ourselves, after inspecting the child when it has been stripped, that it is suffering from rickets and the bones are still soft, walking should be forbidden; but in other cases it is sufficient to order suitable pads for the boots, and they should be worn also in the house till the foot has become normal in form.

Certain details need mention as to the child's bedding, and as to carrying the child about. A firm mattress and a low and firm pillow are best; the child should lie on its back in bed and be lightly covered over; these precautions will tend to prevent rachitic curvature of the spine. The child should take very little liquid with the last meal and the bladder should be emptied before going to bed; these are the best preventive measures against nocturnal enuresis. To prevent the development of scoliosis the child should not be carried on the same arm always; indeed it should never be carried for long, but should be taken out in a perambulator.

As to sleep, it is most important that the child should sleep long and undisturbed; till the end of the third year of life it should have several hours' rest in the morning and afternoon. After three years of age, only in the afternoon, and this should not be discontinued till it is five or six years of age. The child should be put to bed early and all exciting games or tales should be avoided which may disturb sleep and cause night terror and similar conditions.

Their toys should be as simple as possible, free from all poisonous materials, and so shaped that the child cannot injure itself with them; we should, too, be careful where they come from, as they may be carriers of infection.

Although games out of doors are very desirable, yet much coming into contact with the earth should be avoided as much as possible; different germs and the eggs of

intestinal parasites, such as the ascaris lumbricoides, may get on to the fingers from the earth, and as children often have the habit of putting their fingers in the mouth, the germs may thus obtain entry into the body.

As to diet, the principal food up to the end of the second year should be milk, and variety can be obtained by suitable combinations of milk foods, soups and eggs. Throughout childhood milk should be given to the child to drink. I like to avoid the addition of any coffee or tea because of their stimulating effects; but I permit cocoa or chocolate. Meat should not be given before the fourth half-year of life, and it is well not to give any meat till the child is two years of age. It should be given only once a day, and I prefer the different kinds of white meat and fish without bones, which can all be given to the child hashed, with or without the addition of eggs. Before the complete development of the milk teeth meat should not be given except very finely cut up, otherwise the morsels which are but slightly masticated undergo decomposition in the intestine and cause diarrhoea. I must protest strongly against giving children raw meat: the dangers of raw meat outweigh its advantages, for ova or intermediate stages of intestinal parasites or other organized causes of disease and the toxins produced by them get into the child's body through the raw meat. For the same reason no meat should be given to the child which is not quite fresh or which has been insufficiently boiled or roasted; it should not be eaten merely smoked or steamed.

Among beverages alcohol must be avoided in every form; though I do not fear its use as much as do total abstainers, who paint its effects in too dark colours. Though cases of acute or of chronic alcoholic poisoning in childhood are curiosities rather than practical difficulties, yet we can trace a decidedly harmful influence of alcohol upon the nervous system, and we should not early accustom a child to take a substance to which so many human beings later in life fall victims. For this reason and also because, when they are at table with adults, children have things given them which are indigestible, it is best to keep children

away from the meal table of adults until the little ones may eat what is on the table, that is until they are four years of age.

A few words must also be said as to the regulation of children's lives. The tendency of the present day to hurried living influences childhood too, and when we recall to memory our own early years we are often astonished at the games and picture books placed before children, for they give ideas to the young children which formerly were not given till much later. Even their entertainment of friends has taken a form which appears to be a reproduction on a smaller scale of the dinner parties of adults, and the children are overloaded with very indigestible food and evince a certain affectation in their intercourse which often lays the foundation for the affected manners so often seen in girls and which may be the germ of a later hysteria. But other ill results, especially the spread of infectious diseases, also follow this social intercourse among children, and I would therefore urge from the purely medical and prophylactic aspect of the subject, and entirely omitting the educational aspect, that the intercourse of children with other children should be restricted to a few well known playmates.

Another bad custom which is unfortunately very common and should be avoided as liable to cause ultimate mischief is the overburdening of their minds by tasks of memory intended to show their intellectual forwardness. The minds of children are sufficiently burdened with the daily increasing number of impressions which come to them without the addition of the task of learning poems by heart.

Lastly I must speak of the home, and point out the injurious effects of rooms with insufficient air and light, the removing into newly built houses, especially during winter, and the proximity of stables to the house, factors which have an undeniable influence upon the mortality of children.

The evil effects of schools upon the health will be more minutely detailed under the disorders peculiar to later childhood.

I pass on to consider the preventive treatment of the diseases of the various organs of the body during early childhood, and begin with the respiratory tract, including the affections of those parts which are common to the passage of food and air, the mouth and pharynx. The various forms of tonsilitis come first in importance: they begin with the commencement of the second year of life, and are most common in the period of early childhood. Colds and infectious influences assist to cause them; in the so-called chronically recurring exudative forms there is also an hereditary factor; the condition of the mouth and teeth must also be taken into consideration and preventive treatment adapted to these various causes. One should avoid coddling, particularly the wrapping up of the throat with warm scarves. The children should be guarded against sudden changes of temperature, especially at school, where during the intervals the children are often sent out of the overheated classrooms into the cold corridors. The mouth and teeth should be carefully cleansed, and carious teeth should be stopped. All cases of tonsillitis are infectious, and such patients should be isolated; the short duration of the contagion makes further measures unnecessary, but we must wait till every trace of the throat affection has disappeared before allowing the child to return to school. To avoid complications, some of which run a very serious course, the nose and throat should be well washed out with large quantities of weak antiseptics, but I have very little opinion of the effects produced by gargling. The children should learn to gargle early so that the mouth is kept thoroughly clean, but in cases of illness I do not consider it necessary to worry them much with it. Cellulitis and retropharyngeal suppuration, which is not rare at this age, need timely incisions to prevent the pus from going lower. Removal of the tonsils is advised by many, especially in chronic forms of the affection, but I do not consider that the operation is indicated unless the tonsils are so large as to obstruct respiration. I am not of opinion that this operation, which has dangers of its own, is a sure means of preventing a recurrence of the tonsilitis; indeed I have often seen a

recurrence on the scar surface. The same is true for the slitting up of the follicles and other methods undertaken for the same object. It seems to me suitable here to speak about hypertrophy of the pharyngeal tonsil (adenoids), and removal of this tonsil to prevent disturbances which may be caused by its hypertrophy, and I cannot withhold the opinion that we are apt to operate too much. In a large majority of cases the increase of adenoid tissue is only temporary and later disappears, or the development of the nasal cavities removes any disturbance caused by the adenoid growth, and one often sees cases in which no good effect has resulted from the operation, or the old symptoms reappear after a time. Whether this occurs because only part of the pharyngeal tonsil has been removed or because the adenoid tissue has been reformed I am not able to say, though I can vouch for the correctness of the observations recorded above. In these cases I would therefore counsel patience and first attempt a cure with astringent lotions and with astringent powders applied to these parts, and have recourse to operation only when serious obstruction to nasal respiration urgently demands relief. The reflex theory ascribes a number of nervous phenomena to hypertrophy of the pharyngeal tonsil and overgrowth of the posterior ends of the turbinate bones. I can merely state that I consider these assertions somewhat exaggerated, and would point out that such children are known to have a predisposition to neurasthenia; therefore the psychical effect of any operation upon them should also be taken into consideration.

For the prevention of bronchitis and broncho-pneumonia at this period of life, all that was said in a previous paragraph about these affections applies also to this period, but "taking cold" is at this age a more frequent cause of these, and requires special care. In previous sections we have considered how far it is possible to prevent those affections of the respiratory tract which often accompany the various infectious diseases and seriously affect the prognosis. Once more I would contrast the bad influence of treatment in a hospital, and the crowding of patients into badly venti-

lated wards, with the excellent results of adequate ventilation in smaller rooms, and the frequent change of the patient from room to room.

Disorders of the digestive tract do not occupy so important a position in early childhood as they did in infancy; the chief principles which must now guide us in the prevention of these diseases are to give a suitable diet as described above, to avoid giving meat too early, to exclude bad food or very indigestible food, and to prevent the overloading of the stomach which is so apt to occur in children at this period. Plenty of vegetables and cooked fruit are the best means against the obstinate constipation so common during this period of life. A further necessary precaution is to remove the stones from fruit, and to avoid giving any food which cannot be reduced in size by mastication; such articles act as foreign bodies in the intestines, and may lodge in the vermiform appendix and set up appendicitis. Lastly, preventive treatment against entozoa must be considered. I have already pointed out the important factor of playing with earth, of eating raw or imperfectly cooked meat, and of contact with domestic animals. I have only to draw attention to auto-infection by the children themselves, who put their dirty fingers into the mouth and thus convey the ova of worms into the body where the ova then develop; there is also the possibility of the transference of these ova from child to child. On the one hand, strict cleanliness is essential; on the other hand, caution in the intercourse between such patients and their playfellows. It is opportune here to mention the common custom among the public of giving anthelmintics, especially preparations of santonin, as a preventive. I must protest against this custom, and also against the assumption that frequent picking of the nose is a sure sign of worms. Anthelmintics should only be used when worms are passed or their eggs are found in the faeces, and then only by medical prescription. The free sale of anthelmintics to the public by chemists I consider an abuse.

Among diseases of the genito-urinary organs, the most important is vulvo-vaginitis, which may occur in epidemic

form and be very widespread and difficult to control, especially in hospitals and institutions. In a former paragraph I pointed out the prophylactic measures to be taken against spread of the disorder, and against the risks of infection through the mother: besides these infections through accidental contact, we must bear in mind too at this age the possibility of infection of the genitals of children by the malpractices of individuals suffering from gonorrhoea. There is a possibility of spreading the disease by baths used in common. Epstein has pointed out the dangers of public baths in this respect. These children may also spread the affection at school. Preventive treatment should aim at removing all these possible sources of infection. These patients should be isolated, care being taken that their linen and other articles used by them are separately washed; sleeping with strangers should be avoided, the children should be kept away from school; and girls taken into hospital should be examined, and all suffering from vulvo-vaginitis should be at once isolated. It is important too occasionally to examine the secretion microscopically so that the nature of the case may be definitely diagnosed and the duration of infection ascertained.

In boys balanitis is frequent at this age and may be prevented by cleanliness. It is not only an unpleasant condition, which causes pain and urinary difficulties in such boys, but observation has convinced me that it may also be the cause of nocturnal enuresis, and the itching associated with the condition often gives rise to masturbation. The preventive measures are obvious: the glans should be frequently washed, some simple ointment may be applied, and any phimosis treated.

The most important of the diseases peculiar to this period of childhood have now been mentioned, in so far as their course can be influenced by preventive measures, and I now proceed to describe

THE PREVENTIVE TREATMENT OF DISEASES OF LATER CHILDHOOD

To prevent repetition I shall leave out of consideration

those diseases which in their invasion, course and prevention cannot be separated from those of early childhood. Nevertheless all the principles previously laid down must be borne in mind, and they can be carried out more easily now that the child is more intelligent and self dependent. These diseases are influenced to some extent by school life and work, the want of exercise and fresh air necessitated by the increased demands made by education, and further by a new factor, "nervous contagion," which now appears and demands our attention that it may be adequately treated and prevented. The physician and the teacher should work hand in hand, but the physician is unfortunately often unable to act effectively, and the requirements of education and of hygiene are often opposed, and the influence of the physician in the school is less than could be wished. But so far as it is possible efforts should be made to prevent mental overstrain and to check the injurious mental and physical effects which are attributable to education. Prophylactic measures to ensure the normal healthy development of children are as important as the prevention of infective diseases and of digestive, respiratory and similar disorders. The question can be treated only very briefly here, and for details I must refer the reader to works on school hygiene, but for the sake of completeness they cannot be altogether omitted in this book.

Apart from spreading infectious disease, school life may exert a bad influence in various ways upon the physical and mental development of the child. The danger is less in the lower classes, the short school hours, the small amount of homework, the fact that reading and writing are only being begun and the innate restlessness of the child prevent these injurious effects from appearing. But in the later years, even at a primary school, there are too many hours spent in sitting at school, and too much close work for the growing eye, its homework keeps the child too long at the table, and its need for physical movement and fresh air are not sufficiently regarded. Add to this the ill effects of insufficient light, the overcrowding of the schoolroom, the faulty postures in sitting, the bad print of schoolbooks, and

the incorrect position in writing, and we have a number of disturbing causes which must be briefly considered. Myopia is very common in schoolchildren, and increases as the child goes from class to class: it is caused by an excessive effort at accommodation, and it is also harmful for the eyes and therefore it should be prevented by appropriate means. Among these may be mentioned good illumination for every seat, suitable blackboards which do not reflect light and so strain the eyes, well printed schoolbooks, suitable handwriting upright and large, a correct length of the lines and distance between the lines, and the avoidance of artificial light which strains the eyes. These are to some extent already attained in schools with modern equipment and with specially drawn-up rules; but in the home these matters do not yet receive proper attention, and the physician should see that at home too the child has an appropriate place in which to work, and that it is not occupied too long with book work.

Another injurious effect resulting from school and home education is curvature of the spine, caused by badly constructed seats, together with a wrong posture in writing and too long continued writing. Though in most places nowadays care is taken to place a child at a suitable distance and on a bench which is adapted to his size, and the upright style of handwriting now taught tends to make the child sit straight, yet the long hours which a child is kept at writing undoes a part of the good thus accomplished, and this is made still worse by the large amount of homework which the children have to do, generally on badly constructed tables and in bad postures and in insufficient light. One should therefore insist upon the child having a suitable desk at home, which is placed so as to be adequately supplied with light, and one should watch the number of hours given to homework, as the physician is the best judge as to the amount of mental work which a given child can do without injury to itself.

School headaches, anaemia and epistaxis are caused by remaining long in closed and often overcrowded rooms and by the constant exercise of mental energies along this one

channel only, and they are often accompanied by loss of appetite and by insomnia. In this conflict between the requirements of education and of physical health it is often very difficult to convince parents that the latter is more important, and they point out that the child will be outstripped by its competitors. Nevertheless in a few bad cases I have insisted upon a whole year of school life being given up, and have employed this solely in building up the physical health which had been neglected, and I have never had cause to regret this course. It is the physician's duty to see that the child's hours of sleep are not curtailed, and all work after supper should be forbidden. When the intellectual capacity and ability of the child are insufficient to enable it to do the homework during the daytime, the work must be left undone, and it may be necessary to interrupt the education for a time. Out-of-door exercise, gymnastics and field games are the most effectual antidote to the ill effects of much sedentary work. During the few hours given to recreation the mind should be allowed to rest, exciting books, theatres, and such amusements should be forbidden. The child's walks out of doors will supply it with new and fresh experiences. Unfortunately, especially in the higher schools as already said, we are scarcely able to make our influence felt against this common overstrain of children's minds, but nevertheless we must exercise a careful supervision and must put a veto upon this education of a child when we see that its health will be seriously injured thereby.

As regards the diet of children at this age when they dine with adults, all indigestible food must be avoided, the food should be simple, all alcoholic drinks should be excluded as they only tend still further to increase the cerebral hyperaemia already existing. The child should go to bed early, and should be kept from the social entertainments and recreations of adults.

Hysteria, of which we see many serious cases even at this early age, is steadily increasing. The disease is caused partly by the great demands of school life, partly by our modern manner of life. Its preventive treatment is in education,

and it should be remembered that its characteristic manifestations are often passed on to susceptible companions of the same age, and in this way the most remarkable school epidemics arise by "nervous contagion." It is therefore advisable to keep such children from school.

The same remarks apply to chorea, which is so common at this age. Teachers ought to be more familiar with the initial stages of chorea than they generally are; they would then cease to blame and punish such children and aggravate the disease. Here again the need for school physicians is evident.

Night terror requires certain preventive measures: rest of the brain for some time before going to sleep, and the avoidance of mental work, of exciting books, or tales which stimulate the imagination of the child, are the chief points to be observed. From the standpoint of aetiology much more importance should I think be attached to such symptoms when associated with a weak constitution, anaemia and overstrain, than to the hypertrophy of lymphatic tissue in the pharynx or to nasal affections.

Finally I would add that the holidays of these children, short as they are, should be used to remove injurious effects which have arisen during the school year and to strengthen the body to meet the new demands which will be made upon it. All mental work should therefore be forbidden during the holidays, and all that is possible should be done to improve the physical health of these children. For this purpose they should have moderate exercise and plenty of nourishing food, but should not be taken for long tiring walks or mountain tours, as so often happens when fathers take with them their half grown up children.

I come now to the last part of my subject, to the so-called

PROPHYLAXIS IN TREATMENT

This section concerns us physicians most intimately, and I would head it with "*non nocere.*" The great progress made in therapeutics during the last decade is reason enough to make us hold views other than the negative ones of

former times; on the other hand we must guard against going to the other extreme and make use of measures of which we are not quite certain and which are not altogether free from danger. We should keep clearly before us the measures and modes of treatment which are best adapted for any particular period and those which should be avoided. And lastly, the children entrusted to our medical care, whether in private life or in hospitals, must not be regarded as subjects for doubtful experiments. We should always well consider whether the satisfying of scientific curiosity may be of disadvantage to the sick child. These are the limits within which so-called curative prophylaxis should work.

To give a few examples. Opium and its derivatives, morphine, codeine, belladonna and hyoscyamus, should be avoided during the first year of life, since even after very small doses serious symptoms may appear. In the treatment of gastro-intestinal disorders we can obtain much better results by mechanically emptying the digestive tract and by appropriate dietary regulations than by internal remedies, and these should therefore be restricted to the utmost. Infants seem to be particularly susceptible to certain drugs, such as potassium chlorate and naphthalin, while they tolerate relatively large doses of other drugs, such as the expectorants ipecacuanha and senega. Salicylic acid and salicylates are not always tolerated; mercury and potassium iodide, on the other hand, when properly given, leave no unpleasant after-effects. Much depends too upon the mode of its exhibition. With many drugs the most effectual and harmless method is to administer the drug internally in the liquid form, and I may mention, besides those already referred to, the various drugs used in digestive disorders, such as hydrochloric acid, lactic acid, sodium benzoate, magnesium benzoate, and bismuth salicylate. With other drugs cutaneous application is best: for instance, salicylic acid and especially mercury, which is so well tolerated when thus administered, while it readily sets up diarrhoea when administered internally. I would also strongly recommend a trial of the new "merkolint" method

for hereditary syphilis in infants. Subcutaneous injection, very useful in later childhood, is not suitable during the first year of life, and abscesses readily form at the site of the puncture. Caution must be observed too in the use of antiseptics. Experience has shown that carbolic acid is very badly tolerated by infants, that iodoform sometimes gives rise to skin irritation, while corrosive sublimate in weak solution, not over two parts in 1,000, can be used with perfect safety. I altogether refrain from giving internal antipyretic remedies during childhood, at least in the way formerly practised. On the other hand I can strongly recommend lukewarm baths and wet compresses, not so much because of their antipyretic power as because of their soothing effect. A cold bath may readily cause collapse, and should be watched by the physician. I avoid it altogether, and have elsewhere stated my reasons. Even wet compresses may do harm, either by giving rise to eczema or by causing exfoliation of the epidermis as I have seen in delicate children. A new drug should be used with great caution, and at first only in smaller doses than recommended. Enthusiasm combined with a lack of judgment which after a few hasty and insufficient observations lauds the beneficial effects of new preparations should warn us to be cautious. For washing out the stomach and bowel the temperature of the liquid should be exactly taken; too much fluid and too rapid injection of it should be avoided. Personal experience has proved to me that the addition of resorcin and tannin is best avoided. A further precautionary method to be observed in infancy is to give the drug in very small doses and to get the cumulative effect of it, and whenever possible to select the liquid form of the drug, and to avoid during the first months of life any addition of material capable of undergoing fermentation, such as the very favourite syrups.

In later childhood too it is best to avoid treatment of fever by drugs, which after all can only modify an incidental symptom of the infection, but cannot in any way influence the course of the disease; rather indeed, when given in large doses and when badly tolerated, it will give

rise to serious cardiac symptoms. Among antipyretics antifebrin and antipyrin in large doses are often not well borne, but cause vomiting or rashes. Quinine too cannot be extensively used because of its taste and the difficulty of disguising it, and the administration of these drugs in pill or wafer is only possible for older children. The most convenient antipyretic is phenacetin, which is almost tasteless, and small doses of it, one to three grains, are sufficient to bring down the temperature for a few hours without unpleasant after effects. Of the external methods for reducing temperature during the second period of childhood I prefer wet packs and lukewarm baths, while in later childhood I use a bath which is gradually cooled down or a cold douche. But here too moderation is required. The slight reaction of most children after high temperatures, together with the fact that the severest infections often run a course with but slight rise of temperature, considerably limit these indications and only justify us in adopting these measures when there is hyperpyrexia, serious implication of the sensorium or great nervous unrest.

I have already protested against the casual use of worm powders, and I would here caution against the "cures" for tapeworm, especially as the greater number of cases of poisoning by Filix mas are met with in childhood. Such drugs should only be administered by the direction of a physician who lives near the patient.

Anaesthesia by chloroform is often induced for diagnostic purposes or to remove an excitable condition in restless children, and I cannot too strongly protest against this course. Only when there is some vital reason for inducing anaesthesia, such as the diagnosis of a tumour or appendicitis, does it appear to me justifiable; in other cases I consider its use an unpardonable thoughtlessness which may have serious results.

Indeed the use of such heroic methods of examination as have been introduced into hospitals of late years to clear up certain scientific contentions should be restricted within wise limits, and experiments upon human beings, especially

upon children whose consent cannot be asked, should be narrowed down to the utmost. Among these methods are the withdrawal of large quantities of blood for various didactic reasons and dieting methods by which healthy young children are supplied with insufficient food for days. No permanent injurious results have been observed, or at least they have not been recorded, to follow this experimental work, but it scarcely seems to me wise to wait till then. Our experience in the domain of the conveyance of syphilis and of the inoculation of healthy individuals with gonococci shows plainly enough that the utility of such methods is not proportionate to the dangers incurred.

Neither can I speak enthusiastically about lumbar puncture, which has become a favourite method during recent years. It is certainly a valuable addition to our knowledge to have gained information in this way about the pressure within the skull under normal and under pathological conditions, and the amount of albumen present in cerebro-spinal fluid and of the bacteria, yet I cannot maintain that the diagnosis of the various inflammations which affect the central nervous system has been furthered by this method of research. And as to the therapeutic value of this method we feel a little sceptical about the assertions of its enthusiastic advocates. At any rate when we consider the risks of a possible infection of the spinal canal and other possible evil results, it would seem essential that this method should only be carried out in hospitals where there is adequate assistance, and that the physician should send into hospital every child who is to be treated by this method.

Recently too the question of intubation in private practice has been raised, and I would take this opportunity of saying that this course can only be regarded as justifiable and free from serious risk when it is possible to arrange for continuous and adequate medical aid for the child during the first few days.

I will refrain from further detail, as I wished only to point to the directions in which caution should be exercised by physicians in the treatment of children entrusted to their

care, and did not intend to discuss individually every method and every drug employed. With increasing years and experience we become more moderate, and learn to avoid certain therapeutic measures which formerly, with the zeal and sanguine nature of youth, infatuated us. With this I will end my remarks, which have already taken up almost too much space, but my apology for the length of this section is the importance of preventive measures in the most susceptible period of life, when they are most serviceable in the development, education, hygiene and treatment of children. And though there are many omissions in these pages, yet I have I think considered all the means by which it is possible effectually to prevent the diseases of childhood. I hope that the study of aetiology will soon give us a deeper insight into those pathological processes which are still unexplained, and will enable us to meet them with greater knowledge and better results than hitherto, and thus prevent disease and the spread of disease, and secure for the rising generation the conditions of life required for their robust and normal development.

The Prevention of Disease of the Nervous System

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The Prevention of Disease of the Nervous System

The prevention of diseases of the nervous system is the more important because of the ever increasing number of cases of nervous disease at the present day. Unfortunately our ability to prevent these diseases is very slight when compared with their importance. The physician in treating a nervous disease needs to know more than in treating any other disease about the patient's social position, his occupation and his life, if benefit is to follow. To prevent a nervous disease the physician must be in a position which enables him to alter or modify all these conditions; but to what mortal man is it granted to do this! The physician's task of curing a nervous disease is often a very difficult and thankless one, because the best will itself is often frustrated by existing circumstances, and this is true even in a greater measure in connexion with the prevention of nervous disease.

I am conscious of the difficulty of the task before me, of attempting to describe the way in which nervous diseases may be prevented; this difficulty, which arises partly from the fact which I stated above, and partly because to write about the real prophylaxis of nervous disease would compel me to write a history of the present day and that no one desires me to do.

Moreover so much has already been said and written about this subject that it seems unnecessary to touch upon it again, did not this textbook, of which my work forms only a small part, require it for the sake of completeness. In all books upon nervous diseases prophylaxis is always

described, and every earnest medical teacher regards it as his duty to point out to his students how important prevention is in connexion with nervous diseases. Without entering into details about the numerous books on this subject, I would merely refer to the excellent account of the prophylaxis of nervous diseases by Stintzing in the "Handbook of Therapeutics," edited by Stintzing and Penzoldt.

I. The General Prophylaxis of Nervous Disease

The ground from which nervous disease may grow is an inherited neuropathic tendency. The importance of this neuropathic tendency is greatest in the so-called functional nervous diseases, especially neurasthenia and hysteria, which the laity designate by the term "nervous," and which practically form the chief part of nervous diseases. Organic nervous disease never arises from this neuropathic condition alone, whether the predisposition be inherited or acquired; other external factors are needed for the development of nervous disease, but these factors are more effective when grafted on to an already existing nervous predisposition. Thus regard to all neuropathic predisposition deserves much consideration in nervous diseases.

The neuropathic tendency may be inherited through nervous disease in the parents, which has affected the germ or the development of the germ, or it may be acquired through harmful influences which have rendered the nervous system less capable of withstanding injuries inflicted from without.

Can we then prevent a neuropathic predisposition from being inherited?

By neuropathic predisposition is meant, that the offspring of individuals suffering from nervous disease are born with some defective or faulty development, and are from the very beginning less strong than normal, so far as the nervous system is concerned. In forming an opinion as to which nervous diseases in the parents most tend

to cause a neuropathic predisposition, we must be very cautious.

Actual mental disease is most important of all; next come a number of the so-called functional neuroses, such as chorea and epilepsy; and lastly "nervosity." If in regard to mental disease there is clear evidence—such as that a near relative has died in a lunatic asylum, or that another was subject to convulsions—we are no longer upon the safe ground of "nervosity."

What is meant by "nervous"? The idea conveyed is very elastic, and we should therefore hesitate in forming an opinion when it is said that a person is "nervous." But it is otherwise when other additional statements are made at the same time; thus, the mother was nervous and always suffered from severe headaches; or she was nervous and suffered from bad attacks of migraine. Probably however no patients suffering from nervous diseases will be found upon close inquiry to have a family history quite free from nervous trouble. "We are all of us somewhat nervous," a renowned neurologist has said, and the truth of this statement cannot unfortunately be doubted. We might therefore discover a neuropathic predisposition in all cases of nervous disease, and ascribe the origin of the disease to it. But I do not consider we are justified in doing this. Recently the term nervous predisposition has been much misapplied, especially in France, where, for example, rheumatism is said to develop out of a purely nervous condition, so that rheumatic disorders in the parents are regarded as giving a neuropathic predisposition. The occurrence of many cases of nervous disease, especially of mental disease, may, I think, alone be regarded as giving a neuropathic predisposition; and in addition to these, the occurrence of convulsive disorders, such as epilepsy and chorea, and lastly severe forms of neurasthenia which have made necessary the temporary relinquishment of occupation. The statement that some one in the family was "nervous" does not justify us in making the diagnosis of neuropathic predisposition.

But that there is such a predisposition is a fact. What

then are the prospects of prevention? Theoretically the question may be simply answered: an individual with a nervous predisposition should not marry, and thus will avoid the risk of having nervous offspring. This demand is Utopian. Indeed it is certain too that the offspring of a neurotic parent need not necessarily suffer from any nervous disease himself, and his own children may be of perfectly sound nervous constitution. In these cases the physician is however seldom asked for advice. His advice is certainly not asked for in mild forms of nervous predisposition but generally in cases of nervous predisposition when there has also been some severe nervous disease in the parents. It is not an easy question to answer, and cannot be answered in the same way for all. If there have been several cases of mental disease the answer is easy; but these cases do not fall within the range of this section, and will be discussed under the Prophylaxis of Mental Disease. But is every otherwise healthy individual, one of whose parents may have suffered from some nervous disease, to be advised not to marry? That would certainly be going too far. If this were so it would be right also to advise all individuals one of whose parents may have suffered from tuberculosis not to marry—yet how few families there are which are completely free from tuberculosis!

The matter is somewhat different in cases where the children of some nervous parent are themselves affected more or less with nervous disease. Such individuals often go to the physician to ask him for advice about marriage, and whether there would be risk of their children suffering from nervous disease.

Here again it is not always easy to form an opinion. There are certainly cases where it is our duty to prevent marriage if possible, but we must certainly not advise against marriage under all circumstances. It is not absolutely certain that the children of such marriage will suffer from nervous disease, and for some nervous people marriage is a direct and valuable means of cure. I do not think this sexual side of the question is of the importance which the laity think it is; nevertheless sexual intercourse some-

times has an excellent effect upon certain nervous conditions. Above all, the more regular life, the better food which the young man gets when he has his meals at home instead of at a restaurant, and the satisfaction which a happy marriage brings, all tend to quiet and to cure his nervous condition. But the physician is unable to guarantee that the marriage will turn out satisfactorily. Finally, even when the physician feels in duty bound to advise against marriage with an individual suffering from nervous disease, who can answer for it that love will not prove stronger than medical authority?

It follows from these facts that it is very difficult, indeed almost impossible, to prevent neuropathic predisposition from arising by forbidding individuals suffering from nervous diseases to marry. The physician is generally powerless in the matter. But as there is no other way of preventing such predisposition except by forbidding such individuals to marry, it follows that prophylaxis of the inherited tendency is extremely imperfect.

It is necessary to refer to the question whether by forbidding marriage between two individuals who are closely related it is possible to prevent a neuropathic tendency in their offspring. There is no doubt about the fact that repeated marriage among members of a family will produce children who are weakly and who for the most part suffer from nervous disease. A number of aristocratic families are notable illustrations of this fact. The physician can often speak a decisive word in these cases; but one must not speak of the danger as if it were quite universal and without exception, and should rather seek to prevent these marriages by enlarging upon the cases in which these dangers have manifested themselves repeatedly. There are however a large number of cases of marriage between individuals who are nearly related by blood the offspring of which have been endowed with extraordinarily strong nervous systems.

Supposing now that there is no nervous predisposition, that the individual is born with a perfectly sound nervous system, what can then be done to prevent him becoming affected with nervous disease? The answer to this question

would include the whole of the hygiene of the nervous system, because only by living an hygienic life can one remain free from nervous disease. But what is understood by an "hygienic life"? And is it possible for each to arrange his circumstances and his work that he may fulfil the requirements of hygiene for his nervous system? Here we meet with an endless number of difficulties which oppose obstacles to the true prophylaxis of nervous diseases. In the following account we shall refer only to the most important points in regard to the hygiene of the nervous system.

The prevention of nervous disease is attained first of all by a sensible bringing up of children. The parents are entrusted with the sacred duty of maintaining the soundness of the child's nervous system by educating them rightly. Much, very much, might be said upon this subject, but a full description is beyond the scope of this book, and belongs rather to the subject of education. A few points only will be selected, which are of medical interest in physical and mental training.

The first point in connexion with the hygiene of the nervous system of the child is to ensure sufficient sleep. Children should go to bed early and should be got into the habit of going to sleep at once. I do not consider it necessary that they should from the very first be accustomed to a perfectly quiet room. In the country there is generally quiet, but our children brought up in large towns should become accustomed to sleep regardless of external conditions, because it will not be possible to silence all noises during the whole of their life when they want to go to sleep. To strengthen their nervous system, we should let them early get accustomed to going quietly to sleep though there is a little noise outside, and we must not think that the outside noises lessen sleep. Naturally we must not carry this to extremes. The child should early be accustomed to going to sleep without any artificial darkening of the room; moreover it must not be accustomed to going to sleep only when a nightlight is burning. The sleep of a normal child should be independent of such externals, and much may be done to preserve the normal state of the

nervous system if the child is not artificially made to be a slave to certain habits of sleep. The amount of sleep required differs according to the individual. Little children up to school age require quite ten to twelve hours' sleep every day to maintain the nervous system in a healthy condition. When the first earnest work of life comes to the child in the shape of school, the hours of sleep will generally be shortened by these new duties, but the child should have ten hours' sleep daily during the first few years of school life. Above all it is necessary, during the first years of school life, to continue the regular early going to sleep, so that the injurious effects upon the child's body, which are unavoidable during early school life, may be redressed by the most physiological of all means, normal sound sleep. The child who goes to school without having had sufficient sleep injures his nervous system by the struggle between bodily weakness and mental attention, and when this recurs frequently severe nervous disturbances are generally the result.

Besides sufficient sleep we must see that the child gets sufficient bodily exercise. Children should be out in the fresh air for several hours every day regardless of weather, and should early become accustomed to endure wind and rain. During school years regular exercise is of great importance. In this matter Germany is unfortunately far behind other countries, especially England and America. Modern school games are a great step forward in the hygiene of the nervous system, and there is every reason for thinking that the nervous system may be much strengthened by these subsequently. Faulty development may be removed thereby, and it is much to be desired that all such regular bodily exercises should be supervised by an adult. For other reasons too, in the interests of the hygiene of the nervous system, the bodily exercises of children need supervision. All games and sports carried to excess, be they what they may, will later tell upon the nervous system. Cycling carried to excess by children must especially be mentioned; in my opinion it often sows the seed for future nervous trouble.

Further, to strengthen the nervous system and prevent the development of nervous disease, the body must be strengthened by cold water from early childhood. But here too we must warn against extremes. It is quite wrong to attempt to "harden" very young children by cold douching —the reverse effect is generally produced, because children so treated are apt to take cold and lose all pleasure in the daily use of cold water, which when they are older is really a most valuable aid. Unfortunately the extreme measures of Kneipp have done much harm among the laity in this respect.

This means of strengthening the body is best carried out by washing the child in the morning or evening with cold water, in the winter in a room which is warmed—either washing the separate parts of the body in turn, or still better by a sponge bath in which a large sponge well filled with water is taken and squeezed out first over the chest and then over the back of the child as he stands undressed in the bath. During the years of school life this should be done early in the morning directly after the child gets up, to brace up the nervous system. Older children may also go regularly to the swimming baths in the summer. It is also good for the nervous system that the child should early learn to swim, and the sooner it begins to learn the more easily will it learn. But I would not advise that a child under seven years of age should be taught swimming; the body should first be well strengthened. Great mischief, permanently affecting the nervous system, is often wrought by allowing children to remain too long in the water at the baths in large towns. In the interests too of the nervous system we must warn against the use of warm douches, so often seen in baths. If a child is well, a warm bath once a week for cleansing purposes is all that is required in the use of warm water during childhood; to give a warm bath more often than this may be necessary for a diseased nervous system, but it will only weaken a strong one.

The much disputed point whether overwork at school is the source of nervous diseases does not fall within the scope of this work. It is obviously wrong that children should

sit at their lessons till evening or even till night. The prevention of this evil is a matter for the school and for the parents, since it occurs mostly because the child does not know how properly to divide up its work. Regular mental exercise which is adapted to the child's age never does any harm to the nervous system, if it is varied with sufficient bodily exercise. To bring up the child early to orderly mental work, through the school, is a most valuable means in the hygiene of the nervous system. The school by itself never makes a healthy child nervous.

An adequate diet is essential to keep the nervous system healthy, and it needs especial attention during childhood. Milk should be regarded as one of the principal foods of the child, and this excellent food should not be replaced by coffee in the morning. Under all circumstances coffee acts as a nerve poison to the child and should not be given, and the same is true of tea. The rest of the child's diet should be a mixed one, with but little meat. Not that it is necessary to bring children up as vegetarians; although during childhood an exclusively vegetarian diet is to be preferred to a diet containing excess of meat which is so common in our civilized life. In the interests too later of the hygiene of the nervous system in regard to diet, children should be early accustomed to eat all that is given them and should be educated to look upon eating as a duty, not as a pleasure which may be followed at will.

Above all total abstinence from alcohol is an unconditional necessity if the child's nervous system is to remain sound. It is almost incredible how many mistakes are made in this respect among the higher ranks of society. "The child is weak; it must have wine," is a phrase which has done very much harm. The family physician, of whom unfortunately there are now fewer and fewer, can explain to the parents and get them to understand this.

The parents can do much to prevent injury to the nervous system by keeping a watch over the reading of their children. The child whose imagination is already sufficiently exercised by the thousand new things which it has to learn, should be kept from much reading which excites the mind

still more. For the sake of keeping the nervous system healthy, too many books should not be put into the hands of the child. Our modern life in itself brings even to childhood a constant succession of fresh impressions. These cannot be avoided unless we withdraw from the ordinary conditions of life. But we can take care that the impressions made by reading are kept very simple, and this can only be done by not overwhelming them with new books before they have mastered the old. The choice of reading is an important matter too, but we cannot give any general rules. The simplest reading is the best, and under normal conditions the child should first be given some of our beautiful fairy tales which occupy its imagination sufficiently without exciting it. My experience is that, among excitable children more especially, tales of robbers and Indians do much harm. Lastly, children should not be allowed to read up to a short time before going to bed, for the reading may set up restless dreams, which always injure the nervous system.

The endeavour to form the child's character will also fall within the range of the hygiene of the nervous system. Education can do much to remove the wrong tendencies of the will, which later become the ground for nervous conditions. Self control cannot be taught too early to children —an energetic opposition to harmful impressions, an education of the mind to rise superior to external influences. It is impossible to lay down general rules in this matter; they must be individual.

The child's nervous system may further be guarded by keeping the child from too early participation in pleasures which are only for adults: such as concerts and theatres. Such amusements make too great demands upon the imagination and necessitate being up late at night, thus also acting injuriously by shortening the hours of sleep. Unfortunately this is very difficult to attain, especially among the lower classes. The parents want to amuse themselves on Sunday afternoons and evenings—a perfectly justifiable wish. There is no one to leave at home with the children, and they are allowed to go with the parents,

and experience that which is not suitable at their age; at last however nature asserts her claims and the children fall asleep, though not under the normal conditions for sleep. And thus on Sunday evenings in large towns, we see the father with one child asleep in his arms, and the mother close behind wheeling a perambulator in which there is a still younger child asleep. This is a mere mockery of the right way of bringing up a child.

Lastly, reference must be made to taking young children when going on long journeys. It is quite right that school children should be taken into the country in their holidays, where they can spend a few weeks in the fresh air, free from school tasks. But by taking their half-grown children with them, travelling from place to place and even into foreign countries, parents commit a grave error, and act against the interests of the hygienic life required by the nervous system. This concludes all that need be said here about hygiene of the nervous system during child life.

The task before us, the prophylaxis of nervous diseases, increases when the time comes for entering upon one's vocation in life, or preparing for it. Only he is happy who likes his vocation and derives pleasure from it, and much "nervosity" results from following occupations which are forced upon the individual or are taken up by him against his will. Here again the physician is often confronted by circumstances against which he feels himself powerless; but whenever he can, it is his duty to raise his voice in favour of choosing a suitable vocation for the youth. Above all parents should be warned against the tendency of letting young people study though they are not at all adapted for it, and of forcing children from false ambition into vocations for which they are quite unfit, and which lay the germ of nervous diseases.

The years of the storm and stress of youth come. Theoretically much may then be done in regard to the hygiene of the nervous system, practically however measures have to adapt themselves to circumstances, and too much must not be expected.

Wer nie verliess der Vorsicht enge Kreise,
Und wer aus seinen Jugendjahren
Nichts zu bereuen hat, nichts zu beklagen,
Der war nie thöricht—aber auch nie weise.

He who never left the narrow ring of prudence,
And looking backward o'er life's early years
Can see nought to regret and nought which he laments,
Has never acted foolishly—but also never wisely.

So writes the poet, and the words convey a deep truth. In any individual it will depend very much upon his education and upon the moral hold which this has upon him, whether he will guard himself against those excesses which are so injurious to the nervous system during the years of youth. But are we then to shut up our young people and compel them to live a secluded life? Certainly not: we should only thereby prepare the way for many nervous diseases. No sensible man will deny that the requirements of life in the youth are not the same as those of the full grown man. And so long as he does not constantly seek excess in his pleasures, there is no reason why the ascetic plan of life should be held up before him. The point at which excess can be said to begin is a matter which must be settled by the parents or the physician. I find the following a valuable guide: the idea of work must never be lost, and the feeling that life is meant for work must gradually be made to outweigh the thoughts about the pleasures of life, thus will the hygiene of the nervous system gradually fulfil its object. The riotous liver will suffer from nerve disease, the consciousness of having done his duty fails him, and by the struggle between frivolity and duty, in which the former generally wins, the seeds of injury to the nervous system are laid.

Still more difficult is it to point to any general hygiene for the nervous system in later life, when the demands upon the individual by his vocation in life have to be considered. We can only give a few general hints.

Conditions injurious to the nervous system are met with more or less in every calling. Mental overstrain is just as injurious to the nervous system as bodily over-exertion;

but he only who works his utmost will be able to succeed in his calling, and therefore in all work there lies the risk of developing nervous disease. In some individuals the injurious effects upon the nervous system appear sooner than in others; in some they never appear at all; but this cannot be determined beforehand. It is often very difficult to cope with those injurious effects which are the result of the vocation, especially when the means of existence for any individual depend upon that particular vocation which cannot be replaced by any other. We cannot tell overworked employés in business houses to avoid the bad influences which daily act upon them and live a life which is hygienically correct for the nervous system; to do so would be to deprive them of their means of a livelihood. This is true too of brain workers. The educated man whose scientific work makes great demands upon his nervous system, the diplomatist, and the merchant, who live continually in mental activity, as well as in physical activity, become "nervous" through their work; but to remove them permanently from their work would be even more injurious to their nervous system, for they are accustomed to work and would be worse if they had nothing to do. The physician can merely counsel moderation, and can prevent the injurious effects by advising suitable changes from mental to physical work and the reverse. How this is done in any case is of little moment, and must be decided separately for each. In addition there are general hygienic measures which increase the capacity of the body to resist these bad influences; these are sufficient sleep, suitable food and care of the body.

For the hygiene of the nervous system it is very valuable to have regular holiday tours; especially does the man who uses his brain require such holidays. Of course even travelling may convert a valuable hygienic means into one which will injuriously affect the nervous system, if it is a rapid travelling through foreign lands with a constant succession of new impressions.

Nervous diseases which are caused by grief, sorrow and excitement cannot be prevented. Life is not yet perfect,

and whoever lives has to struggle, and traces of the struggle are seen in some form or other in all. This can only be minimised by leading a rational hygienic life which enables the body and mind better to resist the imperfections of human life.

Excesses are important factors in causing nervous disease at this age: more especially the notorious triad,—alcohol, tobacco and sexual excess. How can excesses in these be avoided? The simplest answer would be:—avoid the exciting causes—do not drink, do not smoke, do not seek sexual indulgence. These are extreme views, and nothing is accomplished by extremes.

In regard to alcohol, there are a number of specialists of nervous diseases who regard alcohol as a poison to the nervous system under all circumstances, and are of opinion that alcohol should be entirely avoided in nervous diseases. I cannot agree with this view. Certainly there are cases where an individual of special constitution and predisposition feels decidedly better and his nerves stronger when he takes no alcohol. Thus much may be granted, but no general conclusion can be drawn therefrom which is universally applicable. Experience proves that a large number of men can take a certain small quantity of alcohol without injuring their nervous system, and feel extremely well, in fact better than when we deprive them of this small quantity of alcohol. They should be permitted to have this enjoyment so long as it produces no injurious effects. We are equally justified in stating that other substances too, which are used in civilized countries, such as tea and coffee, may cause nervous disease. Yet it would never occur to any physician to order a person not to take his customary morning coffee, because he has been taking too much coffee or because coffee may produce certain nervous conditions in some one who happens to be very susceptible to its influence.

A distinction must also be drawn between the various periods of life. It cannot be doubted that many drink too much in their student days; the difference is that some continue this abuse after their student days, while others

directly they enter upon the serious business of life know how to be temperate and to control their appetites. I am not, of course, in favour of excessive drinking during student life, because I am well aware that there are cases in which excessive use of alcohol in early life has laid the foundation for nervous disease later, but to forbid beer being drunk at all because excessive drinking may later produce injurious effects upon the nervous system, would be going to the other extreme. There is every reason why, for the sake of a strong future generation, we should reduce so far as possible the use of alcohol in youth, but I am convinced we shall do more in this way than by compulsory total abstinence. The same remarks apply to nicotine. How different is the tolerance for this substance among different individuals needs no further mention. Many men use large quantities of tobacco every day of their life without injuring their nervous system in the very least, while others would suffer very severely if they used as much. Here again commonsense prophylaxis must be adapted to the individual: a general warning against excess should be given, but it is impossible to lay down general rules about the quantity which would be excessive for any one individual.

Much more than is generally thought can be done to prevent nervous disease by observing hygienic rules in smoking. It is particularly injurious to smoke upon an empty stomach, because nicotine is absorbed much more quickly and in much larger quantities by the empty than by the full stomach. Many smokers have a bad habit of biting the cigar and thus allow the tobacco juice to run into the mouth and doubtless they are more likely to be strongly affected by the nicotine. The smoking of cigarettes is most injurious of all and readily gives rise to nervous troubles and to neuralgia. The chief evil of cigarettes is that by reason of their small size they are easily used in excess. There is certainly no objection to two or three mild cigarettes daily.

Finally, to prevent injurious effects upon the nervous system, smoking should not be begun at too young an age.

In connexion with the sexual functions, there arises the important question of the significance of masturbation in the development of nervous disease. Without entering into particulars about the degree in which nervous disease may be produced by onanism, it must be definitely stated that masturbation must be overcome and prevented for the sake of a healthy nervous system. The duty of parents and friends cannot be too strongly impressed upon them, and it is very important that the growing youth should early receive commonsense instruction, because onanism is always first developed through bad example. In later years excess in coitus has to be taken into consideration. Here again no hard and fast line can be drawn which is suitable to all. An amount which produces serious nervous disturbances in one may be perfectly harmless to another, and every man with commonsense will soon find out by experience the amount which is suitable for him. One prejudice must however be combated: abstinence never causes nervous disease, but excess in sexual intercourse causes it in many cases. In the man nature provides a way in which compensation is normally made by involuntary ejection of semen; in the woman we need not take into consideration a want which is not felt before marriage.

The most important factor we know that causes the development of nervous diseases is syphilis, and the prophylaxis of syphilis should form the chief part of the prevention of nervous disease. But it is not for me to write about the prevention of syphilis. This disease is fully described in a special section of this textbook; moreover the prevention of syphilis is a part of general social hygiene, and everything that can be said about its prevention will bear also upon the prevention of nervous diseases.

In addition to these causes of nervous diseases and their prevention, there are a few subsidiary points which have to be considered—subsidiary in so far as we are able to do very little if anything to prevent them. First, mention must be made of injury, which is undeniably the cause of many nervous diseases. Every sensible human being takes care to guard himself from injury, he would never willingly

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expose himself to trauma, and against unexpected accidents we can do nothing. Great care should be taken to protect children from injury, especially from injuries to the head, which may later on cause nervous diseases. The same is true about taking violent colds and getting wet through, both of which are important factors in the aetiology of nervous disease. Here again no one willingly exposes himself to these conditions, but seeks to avoid them by living a generally hygienic life.

II. The Special Prophylaxis of Nervous Diseases

A. THE PREVENTION OF DISEASES OF THE BRAIN AND MEMBRANES

1. *Haematoma of the Dura Mater* (*Pachymeningitis Haemorrhagica*).

Prophylaxis has here very little scope. The most it can do is to treat and prevent alcoholism, which is often the cause of the haematoma. Patients who suffer from diseases which cause the vessels to give way readily, such as leucaemia, pernicious anaemia and scurvy, should be specially warned against injuries to the head: a fall upon the head may be sufficient in these cases to produce haematoma of the dura mater.

2. *Meningitis.*

Prophylaxis of inflammation of the arachnoid and pia mater is indeed only possible for the purulent form, and consists in carefully looking for and removing all inflammatory foci in the neighbourhood of the head, from which a meningitis might proceed; more particularly all purulent discharges from the ear should be treated, abscesses in the neck should be opened early, and inflammations of the scalp be surgically treated. Carious teeth should also be attended to, and it must not be forgotten that the infection may come from the nose and throat. Every injury to the scalp or skull must be thoroughly treated in accordance with the rules of antisepsis. Injuries in fencing must also be considered, for they are often entrusted to inexperienced hands and they may result in meningitis.

There is only one method available against tuberculous meningitis, and that is the radical removal as early as possible of all tuberculous deposits. Unfortunately great, often insuperable, difficulties stand in the way. It is possible often to stop the carious process in a bone or remove it by resection, or to remove tuberculous glands from the neck, but the physician is powerless in those sad cases where a tuberculous meningitis develops though the patient is apparently in sound health, and the autopsy shows that the cause was a caseous bronchial gland which had been the result of tuberculosis in childhood and had remained latent for many years. All we can do is to urge that a child with any predisposition to tuberculosis should from an early age be brought up in a way which will strengthen the body. Prolonged residence at the seaside is of the greatest value. During school years every precaution must be taken to prevent excessive mental strain; headache should be specially noted, for it is often complained of by tuberculous or weakly children, and is often the first symptom of meningitis. School work should at once be left off and the child be in the fresh air without any form of mental exertion. Unfortunately no one who suffers or has suffered from tuberculosis is proof against an attack of meningitis.

In epidemic cerebro-spinal meningitis prophylaxis consists in strictly isolating the patient. It should be noted that during an epidemic of cerebro-spinal meningitis, other infective diseases often prevail which may be followed by this disease and which therefore require even more careful treatment than usual: sometimes the disease develops out of an ordinary simple bronchitis. During an epidemic, care should be taken to avoid cold, particularly sleeping upon damp ground, because it is not inconceivable that infection spreads along the nerve sheaths of the peripheral nerves.

3. *Thrombosis of the Venous Sinuses of the Skull.*

Thrombosis of the venous sinuses is most often the result of general marasmic and cachectic conditions pro-

duced by cardiac weakness, profuse haemorrhages, chronic diarrhoea, malignant new growth, or wasting chronic infective and constitutional diseases, such as tuberculosis, syphilis, leucaemia, diabetes and pernicious anaemia. Prevention coincides with thorough treatment of these diseases. The acute infective form follows acute infective diseases or is the result of infective suppuration following some accident to the head, so that we can scarcely speak of its prevention. Generally we are quite helpless to prevent the development of sinus thrombosis, especially after infective diseases.

4. *Disturbances in the Circulation of the Brain.*

A number of nervous symptoms are caused by defective circulation in the brain; either by anaemia or by hyperaemia. These conditions may be primary, or secondary caused by other illnesses. Unfortunately an exact diagnosis of anaemia and hyperaemia of the brain is extremely difficult, and it is therefore difficult to give rules for the prevention of these conditions.

Cerebral anaemia may be only part of general anaemia, and may therefore be acute or chronic. In these cases the object of prophylaxis must be to prevent cerebral anaemia by using every available means to remove the anaemia by general dietetic treatment by drugs and by other means. Anaemic patients need careful supervision, because in them all intercurrent diseases accompanied by loss of fluids readily produce cerebral anaemia. Physiological processes must also be carefully watched: in women attention must be given to profuse menstruation, and prolonged suckling must be forbidden. To prevent cerebral anaemia, anaemic patients should not sleep with the head too high and must be careful to avoid all conditions which by causing hyperaemia of other parts of the body would produce cerebral anaemia, for example damp feet and getting wet through. Moreover cerebral anaemia may result from disease of the heart and vessels. Here the cerebral anaemia is generally of very acute onset, and its prevention depends upon treatment of the primary disease.

In cerebral hyperaemia a distinction must be drawn between the active and the passive forms. The active form arises through overstrain of the brain in consequence of excessive mental activity, of excessive action of the heart after physical exertion, or of a sudden rush of blood to the head from more distant parts of the body. It may also be due to poisons, such as alcohol, nicotine, caffeine, theine, amylnitrite, or nitroglycerine, or it may be produced by sunstroke. Lastly, there are people with a tendency to cerebral congestion in whom the hyperaemia is caused by some congenital vasomotor spasm of nervous origin. Prophylaxis of cerebral hyperaemia is possible in the latter case and consists in hygiene both mental and physical. All mental irritation by too severe mental exertion must be avoided, and there should be a wise alternation between mental and bodily work. This is especially necessary during the years at school. Care must be taken not to allow external conditions to make the mental work more difficult—such as small print, dark rooms, bad posture in reading or incorrect illumination. Bodily exercise to prevent cerebral hyperaemia should above all be methodical, such as gymnastics, especially those movements which tend to draw the blood down from the head ; and sports, among which riding is especially good ; while other exercises which make great demands upon the heart, such as cycling, skating, and excessive mountain climbing increase the cerebral hyperaemia and are less to be recommended and should be used with care. For all these forms of exercise the head should be covered to prevent sunstroke. It is necessary too to see that meals are regular and the digestion good. Alcohol in every form must be avoided; only very little smoking may be indulged in, and tea and coffee should be avoided.

Cerebral hyperaemia in people who tend to get congestion may be very satisfactorily prevented by suitable hydropathic applications. Those applications which draw the blood from the head are best, such as cold foot baths of short duration, rubbing down the whole body with cold water, and hip baths. In all these methods the head should be kept cool by a wet compress.

Passive cerebral hyperaemia is the result of obstruction to the return of the blood from the head as a consequence of cardiac lesions, or of obstruction in the pulmonary circulation. It may also be produced by rise of blood pressure through increased abdominal pressure, as in coughing, sneezing, or in straining at defaecation, or by compression of the jugular vein by a goitre, tumours, and by a collar that is too tight.

In the case of an excessively tight collar prophylaxis can do much, though often we have a hard and not always successful battle to wage against fashion and prejudice. The prevention of cerebral hyperaemia caused by cardiac and pulmonary disease does not belong to this section.

5. *Cerebral Embolism.*

The source of cerebral embolism is in most cases the heart, and prevention of this morbid condition depends therefore upon treatment of the original trouble. Great importance attaches to the energetic treatment of acute endocarditis by long continued rest both bodily and mental. Much can thus be done to prevent a vegetation from becoming detached. In many rheumatic cases the long continuous use of salicin, antipyrin, or salophen is indicated. That a heart lesion may at any time give rise to cerebral embolism is clear, so to prevent it general treatment must be adopted, and every effort must be made to prevent disturbance in the compensation, because experience has shown that this tends to produce cardiac thrombosis and embolism. Cerebral embolism may also be prevented by treating cardiac debility in acute infective diseases, and in disease of the muscle substance of the heart.

Atheroma of the aorta as a source of cerebral embolus is not a condition for which there is any prophylaxis except general measures. Mention must be made of the importance of certain syphilitic forms of aortic aneurism which may cause cerebral embolism. It is therefore most essential that aortic aneurism from this cause should be treated with antisyphilitic remedies. And further in all cases of

aortic aneurism complete rest of the body is needed to prevent cerebral embolism.

6. *Cerebral Thrombosis.*

The chief causes of cerebral thrombosis are arteriosclerosis arising from old age, from alcoholism or from syphilis. Against old age there is no prophylaxis ; in alcoholism and syphilis the ordinary methods must be resorted to in order to prevent thrombosis, but they are not always successful. Further, cerebral thrombosis may arise from cardiac weakness ; it either exists alone as the result of some organic affection of the heart or it may be combined with one of the conditions above mentioned which lead to cerebral thrombosis. This should warn us to be specially careful in any case where there is a suspicion of cardiac weakness and arteriosclerosis, and everything should be forbidden which would make too great a demand upon the heart, such as excessive bodily and mental exercise, alcohol and hot baths. If syphilis exists there must be no delay in using antisyphilitic treatment. This will often succeed in averting threatening cerebral thrombosis. The premonitory signs of thrombosis must be looked for, namely vertigo, headache and paraesthesia of the extremities. If the patient is suffering from syphilis, or there is any suspicion of syphilis, treatment by inunction should be commenced at once.

7. *Cerebral Haemorrhage.*

The prophylaxis of cerebral haemorrhage is identical with the prophylaxis of arteriosclerosis. The opinion is now held that all cerebral haemorrhages except those due to accidents, and these cannot be prevented, arise as the result of arteriosclerosis. To prevent cerebral haemorrhage it is essential to prevent arteriosclerosis from being developed. The conditions which produce this abnormal condition of the vessels are very various. Prophylaxis is of no avail in the senile form. Syphilitic forms can be prevented by early and energetic treatment of the syphilis. Those caused by lead and other poisons belong to the group of diseases due to occupation, and their prevention belongs

to hygiene. Those forms which arise in the course of renal and cardiac disease have no special prophylaxis. Lastly, arteriosclerosis may be the result of chronic alcoholism, and the prevention of this must be according to general principles. On the other hand prophylaxis is most useful for those forms which must be regarded as directly inherited. There are certain families in which apoplexy occurs very frequently, and the members of these families need to take every precaution to guard against it.

Cerebral haemorrhage as the result of arteriosclerosis rarely sets in without some external cause, but occasionally it occurs during sleep. As a rule the miliary aneurisms produced by arteriosclerosis give way under the influence of some external, generally a purely mechanical cause. When the physician has taught one who suffers from arteriosclerosis what are the dangers he ought to avoid, he has done all that is possible to prevent cerebral haemorrhage. It is very important to be on the look out for any symptoms which may arise during the course of the disease; the condition is often present for a long time without giving rise to any disturbance, yet evidence of compensatory changes may long be manifest. Often however premonitory symptoms of a threatening apoplectic attack are recognized fairly early. They are headache, giddiness, and a feeling of numbness in the extremities. The latter symptom is very important but is only slightly known. If therefore a patient comes to the physician complaining of these symptoms, and arteriosclerosis is diagnosed, whatever be its cause certain precautionary measures should be taken.

A miliary aneurism always breaks suddenly because the blood pressure has been considerably raised. The object of prophylaxis is therefore to prevent everything which would cause such increase of blood pressure. The patient's life must be regulated. Moderate meals should be taken and all overfilling of the stomach be avoided; the food should be easily digestible, and a regular evacuation of the bowels obtained. As to the kind of food it is best to restrict the amount of meat and to advise a more

vegetarian diet. The faeces should be soft because a great strain at defaecation has often caused cerebral haemorrhage. The patient should therefore be recommended to take some mild aperient, such as Marienbad, Carlsbad or Homburg water, or Hunyadi-Janos every morning before breakfast. But a warning must be uttered against stronger purgatives because they readily produce cardiac weakness, and this, together with the arteriosclerosis, is apt to cause thrombosis. All overstrain of the brain must be avoided, and all excessive mental activity. This point needs especial attention. Old people with arteriosclerosis feel, probably because of defective cerebral nutrition, some diminution of mental capacity, especially in the power of taking in fresh ideas. If the patient attempts to compel his attention, and revive the former capacity for thinking, a considerable flow of blood goes to the brain. Whenever possible it is therefore best to forbid mental activity altogether for a time. The combination of excessive mental work and excitement is particularly injurious: the wholesale merchant and the diplomatist with arteriosclerosis are therefore always liable to have cerebral haemorrhage. Night work must of course be altogether forbidden and care must be taken to secure regular and sufficient sleep. It is very injurious to be in hot ill ventilated rooms, therefore large assemblies and theatres should be avoided especially in summer. All playing of cards for money must be strictly forbidden, for this is more than a mere pleasure. Rational bodily exercise is important. To take a walk regularly at the same hour, avoiding the strong heat of the sun, is beneficial: the difficulty is that patients will not persist in this habit, because they find it tedious. It is therefore well to recommend a regular course of gymnastic exercises; this keeps the patient regularly occupied and with a duty to be performed. Those gymnastic movements are best which tend to draw the blood from the head; then those which act upon the digestion, and lastly those forms which regulate the cardiac action. On the other hand we must warn against indiscriminate gymnastic exercises performed without advice, particularly

by elderly people. There is no objection to gentle exercises without apparatus in moderation, but exercises with apparatus should be strictly forbidden, more especially those which alter the ordinary position of equilibrium of the head and thus cause a rise of blood pressure. This is true too of all sports; everything which raises the heart's activity must be avoided: cycling, games with balls, lawn tennis and rowing. There is no objection to riding if the patient is a skilful and moderate rider, but it may do harm if begun only after arteriosclerosis has developed.

Much harm may be done by the use of cold water. Patients with arteriosclerosis and headache and a feeling of lassitude instinctively feel a need of refreshing themselves by cold water, and little suspect how dangerous its incautious use is to them. Unfortunately this desire is often supported by unconscientious quacks and other nature healers, and alas! also by some doctors who empirically and without previous knowledge recommend cold water as the only remedy for suffering humanity. All cold applications, such as cold baths, rubbing down with cold water, and cold sitzbaths, must be avoided, because the effect of the cold upon the cutaneous vessels causes a strong contraction which sends the blood inwards to the internal organs, especially the brain, and produces a great rise in blood pressure. The only cold applications which may be recommended are brief cold foot baths at a temperature of 55° to 60° F., lasting one to three minutes. The head should previously have been cooled by a cold wet cloth and should be covered with a cold compress while the foot bath is being taken. Even more dangerous than the incautious use of cold water is the use of hot air and vapour baths for all who suffer from arteriosclerosis. They are often taken instinctively, especially for the above mentioned numbed sensations of the extremities, which are often thought to be "rheumatic" and are treated with vapour baths by the advice of some friend. Vapour baths and arteriosclerosis are absolutely incompatible, and it should be a rule, though it is difficult

to carry it out, that no vapour bath should be given except the patient has been previously medically examined. The sudden deaths which occur repeatedly every year in vapour baths but are kept silent from business motives show the need for making such a rule.

Patients with arteriosclerosis may take warm baths with perfect safety, that is a simple bath at a temperature of 85° to 90° F. But care must be taken that the bath room is not overheated, because the hot moist air readily produces increase of the blood pressure. Unfortunately this overheating of the bath room is an evil to which those who bathe in private bath rooms and often also in public baths are exposed, and arises from the fact that for reasons of economy the bath rooms are made too small.

Chronic alcoholism is a great danger for many who suffer from arteriosclerosis. The condition of acute intoxication is particularly dangerous, because the sudden enormous increase of cerebral pressure brings with it the danger of haemorrhage. The patient must be solemnly warned against drinking much. But even apart from such occasional excesses the use of alcohol must be restricted to a minimum. It is not necessary that the man accustomed to a moderate use of alcohol should suddenly give up taking any. On the contrary a glass of light moselle wine or of red wine at meals merely stimulates and strengthens and can do no harm. But all wines which contain much alcohol should be avoided, such as port, sherry, champagne, or generous Hungarian wines. Caution should also be observed in the use of nicotine. Here too habit and custom have to be considered. There are men with arteriosclerosis who from youth up have been habitual smokers and have used large quantities of tobacco daily without any injurious results. Still the physician should pay attention to this point, and if smoking has not yet become such a passion that it cannot be given up or can only be given up in part, he should urge reducing the smoking to the smallest possible amount. Special warning should be given about the immoderate use of cigarettes which are much more injurious than cigars.

Lastly, attention must be given to the subject of coitus. On account of the excitement associated with coitus there is a great flow of blood to the brain, and this may cause a miliary aneurism to give way. Coitus is especially dangerous in old people—and most who suffer from arteriosclerosis are old—because in addition to the mental excitement excessively great physical exertion is made owing to loss of potentia coëundi, and sad cases of apoplexy sometimes occur on the night after marriage in old men who have only late in life commenced to enjoy the pleasures of married life.

Finally reference must be made to those cases where apoplexy sets in without any warning or at night. It is generally assumed that the dorsal posture at night is responsible for these nocturnal cases, because the blood cannot flow so well from the head in this position. To prevent this it is well to advise those who have arteriosclerosis not to sleep with the head too low.

8. *Cerebral Abscess.*

Prophylaxis is only possible in the sense that any suppurative focus near or on the skull should be removed as early as possible. This is especially true about suppurative otitis, which can be diagnosed early, and should be submitted to surgical treatment. About the time for operation surgeons and aurists must be consulted; from the point of view of the physician for nervous diseases operation should be undertaken when there are signs showing that suppuration threatens to extend to the brain: these are increasing coma, headache, vomiting, and occasionally the presence of optic neuritis. In addition to treatment of otitis, care should be taken to treat antiseptically all injuries to the head, because these may give rise to cerebral abscess.

9. *Cerebral Syphilis.*

It is a well known fact that the brain is the part most often affected in secondary and tertiary syphilis. Henschen records that among 754 syphilitics in the hospital at

Helsingfors 112 had cerebral syphilis. This cerebral syphilis can only be prevented by thorough and very early antisyphilitic treatment. It is difficult to say how far it is possible to prevent cerebral syphilis by these measures, but observations recorded in literature seem to show that most patients who get cerebral syphilis are those who have had very little or no antisyphilitic treatment. For the rest, prophylaxis of cerebral syphilis must be according to the principles of prophylaxis of syphilis detailed in a special section of this book.

Another question is whether, directly objective symptoms of commencing cerebral syphilis are manifest, it is possible to prevent further progress of the cerebral syphilis or to cure it by antisyphilitic treatment. Although this question does not, strictly speaking, belong to prophylaxis, but rather to the therapeutics of cerebral syphilis, yet it may here be referred to, because the initial symptoms of cerebral syphilis are mostly so vague and indefinite that one is obliged to try the effect of antisyphilitic treatment before being quite sure of the diagnosis. I am of opinion that in all cases in which there is a history of syphilis or there are doubtful objective signs of syphilis, the patient should be submitted to a course of antisyphilitic treatment. When syphilis has existed for a long time and has been very inadequately treated or not at all, it is necessary at once to start treatment with a view to prophylaxis directly symptoms connected with the nervous system appear. The most important symptoms are paralysis of the ocular muscles, differences in the pupils, abnormal reaction of the pupils, transient hemiplegia, weak memory and mental symptoms. In many cases it is possible to prevent further progress of the disease by energetic treatment by inunction, and a number of cases of progressive paralysis--and most such forms are the result of cerebral syphilis—are known in which an important and permanent remission was brought about. We should not be deterred by the numerous cases in which inunction has had no good result, but should regard it as a duty, seeing that there are no other therapeutic measures

for syphilitic brain affections, to use a drug which we know to act as a specific in syphilis, although we cannot guarantee in any given case that it will effect a cure. The only contra-indication to antisyphilitic treatment is when the patient is physically so run down that treatment by inunction would hasten the physical break-up.

In contrast with the great importance of antisyphilitic treatment in the prophylaxis of cerebral syphilis all other measures are quite subsidiary. It must be remembered that a central nervous system which has been attacked by syphilis is less capable of resisting those things which we know by experience to affect the brain injuriously, especially alcohol and sexual excess, and the patient should be warned of this. It cannot be positively proved that chronic alcoholism is a direct cause of cerebral syphilis, in the sense that syphilitic infection occurs more easily in an alcoholic, and later causes the development of cerebral syphilis; but this at least is certain, that when syphilis is present, repeated alcoholic excess favours the action of the syphilitic poison and thereby the extension to the brain, and that alcohol should be restricted as much as possible in syphilitics.

The same remarks apply to sexual excesses: these weaken the body and thus prepare the way for syphilitic affections of the brain, and moreover they make it possible for the patient to become again infected by syphilis.

Those who have syphilis should avoid all mental overexertion, and so far as possible all excitement and accidents to the head. The possibility of a traumatic origin of that form of cerebral syphilis characterized by progressive paralysis is not proved, though possibly a trauma upon a syphilitic foundation may produce the disease. Of course the prevention of trauma is not often practicable.

Other general measures must also be carried out, namely a regular alternation between bodily exercise and work, care of the body, and particularly of the nervous system.

10. *Cerebral Tumours.*

The prevention of cerebral tumours is only possible in

the case of cerebral gummata, and this has already been described in the previous chapter.

It is probably difficult to prevent tubercle of the brain; but when tuberculosis is present, obviously everything should be done to cure the disease thoroughly.

Secondary cerebral tumours may be prevented by early surgical removal of the primary tumour.

Trauma is of some importance in connexion with the prevention of cerebral tumours. It is the duty of every one to prevent accidents whenever possible. There are cases in which symptoms of cerebral tumour follow a very slight injury to the skull. It may therefore be possible to help to prevent the development of cerebral tumour by adequate care and attention even after the most trivial head injury. This is not easy to accomplish, because there is in most cases no open wound or objective sign left by the accident, and people therefore do not seek medical advice at all, or only later when subjective symptoms have developed. In a patient suffering from syphilis who meets with a head injury, we should as a prophylactic treat him again with antisyphilitic remedies. A similar course must, in a sense, be followed with tuberculous patients, especially children who have received any head injury; extra care should be taken, and energetic treatment of the primary disease be resorted to. The whole question of the possibility of a traumatic origin of cerebral tumours is still so obscure that we cannot say that appropriate treatment would, in any given case, have prevented the formation of a cerebral new growth.

11. *General Paralysis of the Insane or Progressive Paralysis.*

If one adopts the view that general paralysis never occurs except in syphilis, then the prevention of this disease is included in the prevention of syphilis or of the further extension of syphilis if already present, as has been detailed under cerebral syphilis. But if in addition to syphilis one recognizes other aetiological factors in progressive paralysis, then the scope for prophylaxis will be a

greater one. Without discussing the question whether one is justified in believing that syphilis is the only cause of progressive paralysis, we shall briefly mention the other factors said to be concerned in producing progressive paralysis, and their prevention.

In addition to syphilis we have to consider chronic alcoholism, great and prolonged mental excitement and trauma. The prevention of these is difficult. That chronic alcoholism should be avoided is obvious, apart from the possibility that it may cause disease. Certainly it is our duty to restrict the abuse of alcohol, and when possible to forbid it altogether to prevent the development of progressive paralysis. Among mental excitement we have to consider all forms of excitement combined with great mental overstrain. Here the physician is often unable to do anything, because he cannot alter the circumstances of the patient, but he can always point out the danger which lurks in mental over exertion, and endeavour to free his patients from it. As to trauma, the remarks are applicable which have already been made about it.

B. PROPHYLAXIS OF DISEASE OF THE SPINAL CORD

1. *Locomotor ataxia.*

Syphilis is doubtless the principal cause of tabes dorsalis, and to prevent it the syphilitic infection should be early treated. The same principles are applicable as for cerebral syphilis and general paralysis. The treatment should be both early and thorough. Unfortunately it is impossible to deny that, notwithstanding early and thorough anti-syphilitic treatment, tabes dorsalis has nevertheless appeared; yet energetic treatment of the primary infection must be urgently pressed in order as far as possible to prevent post syphilitic tabes.

Causes, other than syphilis, which are said to produce tabes probably are only subsidiary to syphilis. For these general measures only are applicable, namely, removal of the neuropathic tendency, avoidance of all alcoholic and sexual excess, colds and over exertion of the lower limbs. None of these however are special to tabes.

2. *Syphilitic Spinal Disease.*

For other syphilitic spinal diseases, such as syphilitic spinal paralysis, syphilitic meningitis and meningomyelitis, the treatment is that given above for syphilis.

3. *Diseases of the Columns of the Cord.*

For the diseases of the columns of the spinal cord there is no prophylaxis. We do not know how they are caused: possibly there is some congenital tendency against which we are powerless. A few rare cases seem to develop after severe anaemia and cachexia—energetic treatment of the original trouble might possibly prevent the threatening secondary spinal cord disease, though proof has not and probably cannot be given.

4. *Hereditary Ataxy.*

To prevent hereditary ataxy—Friedreich's disease—is impossible, because doubtlessly there is here some congenital morbid predisposition of the spinal cord.

5. *Amyotrophic Lateral Sclerosis and Progressive Spinal Muscular Atrophy.*

The same remarks are applicable to amyotrophic lateral sclerosis and progressive muscular atrophy. These are conditions in which we may state probably with certainty that a predisposition is the sole cause, and that the occasional causes described, such as trauma, cold and overstrain are only provocative factors. In all these forms the most that can be done is to bear in mind that there is a neuropathic taint, and to aim at avoiding all injurious conditions which are apt to increase a neuropathic tendency that is already present or else to produce it.

6. *Acute and Chronic Anterior Poliomyelitis in Adults.*

Acute and chronic anterior poliomyelitis in adults, especially the former, is the result of an infection which is altogether unknown and therefore incapable of prophylaxis.

7. *Acute Myelitis.*

Something, though not much, may be done to prevent

acute myelitis, because this disease generally follows some acute infection, more especially acute infective diseases in the narrower sense of the term, such as pneumonia, typhoid, scarlet fever, variola, measles, diphtheria, erysipelas and influenza. Though we are unable altogether to prevent these infections and get rid of their poisons, yet something can be done to prevent the appearance of myelitis as a secondary affection, by treating the original disease very carefully and thoroughly. Yet we have often seen cases which have been very badly and inefficiently treated, and yet they have not been followed by myelitis, while others which have been especially well treated in hospitals have nevertheless developed myelitis. Still we must not disregard the great value of thorough treatment of the original disease.

The prevention of myelitis after gonorrhoea and syphilis belongs to the prophylaxis of venereal diseases.

It is extremely uncertain whether there is a purely rheumatic acute myelitis produced by cold and by wet, or a purely traumatic form: if they exist these forms can only be prevented by general measures.

8. *Multiple Sclerosis.*

If it is correct that multiple sclerosis is produced by infective diseases, what has just been said is here also applicable. This disease is probably also caused by metallic poisons, such as lead, quicksilver, copper and zinc, and its prevention belongs to hygiene.

9. *Syringomyelia.*

Syringomyelia is certainly the consequence of a congenital morbid predisposition of the spinal cord, probably some abnormal development of the cells of the central canal. There is therefore no prophylaxis for this disease. It is well however to bear in mind the recent observations that trauma may be the exciting cause of the disease, particularly injury affecting the back.

The development of the disease may under certain conditions probably be prevented, if the patient is kept in

the recumbent posture as long as possible after the accident and if any changes in the vertebral column which have resulted from the fall receive early and careful treatment.

10. *Compression of the Spinal Cord.*

Prophylaxis is of value to prevent compression of the spinal cord. In youth acquired kyphosis and other deviations of the vertebral column from the normal may be remedied by early orthopaedic and other appropriate measures, which may cure the bony disease and so prevent the development of secondary compression of the spinal cord. Every effort should be made to protect these patients from accidents: experience shows that a blow on a deformed spinal column may be the cause of the rapid development of compression of the spinal cord. I need not speak about the operative treatment of deformity of the spinal column, but the great impetus given of late years to the surgery of the spinal column makes it possible that these unfortunate patients with kyphosis may every year be more and more saved from the threatening danger of compression of the spinal cord.

For deformities of the spinal column caused by trauma the only means by which disease of the spinal cord can be prevented is prolonged absolute rest, combined sometimes with appropriate extension apparatus to remove the deformity early.

Compression of the spinal cord by tumours either of the vertebral column or of the spinal cord itself is beyond prophylaxis.

11. *Membranes of the Spinal Cord.*

Among diseases of the spinal cord membranes, the most common are syphilitic in origin, and to these reference has already been made. There is no possibility of prophylaxis for the other forms.

The prophylaxis of diseases of the spinal cord is in general very unsatisfactory. The reason probably is that in the development of spinal cord disease we have to fall back upon two main possibilities: congenital tendency and syphilis. All other causes are still obscure.

C. THE PROPHYLAXIS OF DISEASES OF THE PERIPHERAL NERVES

1. Motor Nerves

A. *Paralysis*

Paralysis of peripheral motor nerves may, broadly speaking, arise in one of three ways: by trauma, by cold, or by the action of poisons.

(*a*) The prevention of traumatic paralysis of peripheral nerves is but rarely possible. It has already several times been said that no one willingly exposes himself to trauma, and that the prevention of accidents in certain occupations belongs to the subject of hygiene. Prophylaxis is possible only in the sense that one tries so far as possible to minimise the consequences of the accident: thus, when the nerve has been damaged by a stab, cut, or bruising, a suture should be passed to unite the severed ends of the nerve, or, if it is only probable that the nerve has been severed, it should be exposed and its condition examined. The sooner the nerve ends are united by suture the better the prognosis of the paralysis.

Moreover the idea conveyed by the term trauma must not be too narrowly interpreted, so as to include external violence only. There are several forms of internal violence which are of great significance in the prevention of paralysis. A nerve may be compressed by a bone, as in a fracture, a dislocation, or by caries, or a tumour. A nerve may be pulled on or stretched by inflammatory processes in soft parts, as by scar tissue, aneurisms, tumours, or enlarged glands. For these cases timely operative interference is required, and in this sense the prevention of peripheral paralysis consists in the treatment of the parts in the immediate neighbourhood of the nerve.

(*b*) One can guard against cold, and no sensible being would willingly expose himself to cold any more than he would to trauma. True prophylaxis however of paralysis by cold is impossible because we are not sufficiently well informed about the essential pathology of this disease. The latest investigations show that in one form of paralysis from

cold, rheumatic facial paralysis, there is present a neuritis, which is most marked towards the peripheral parts of the nerve and decreases in intensity as we pass towards the central end. We may perhaps apply this to all paralyses from cold. The old teaching about an inflammatory swelling of the neurilemma is now abandoned, and we know that the cold, that is, the effect of a great difference in temperature, most affects the more exposed peripheral parts of the nerve. But why in one case a current of air impinging upon the heated face should cause paralysis, while in hundreds of other similar cases it does not, is a riddle which still awaits solution, and for the present we are obliged to fall back upon the theory that the nerve must be in a fit condition to be paralyzed by the cold. What this condition is is still obscure, and we are compelled to insert the unknown quantity x in our teaching about paralysis by cold.

(*c*) Paralysis of the peripheral motor nerves by poison is the result of a chemical process produced by certain metals; among the more important are lead, arsenic and mercury. The prophylaxis of such paralysis by metals belongs to hygiene and cannot be here dealt with. This is also true about paralysis caused by all other metals.

A further way in which poison may affect the peripheral nerves is in acute infective diseases. How far it is possible for us to prevent the virus from attacking the nervous system is very questionable. Often secondary peripheral paralysis has followed cases of infective disease which have received the best and most careful treatment, while it has remained absent in cases which have received no treatment at all, or have been under the worst conceivable surroundings. Whether the more recent specific treatment of acute infective disease with antitoxins prevents peripheral paralysis or diminishes its severity is a point not yet determined. Lastly, there are cases of paralysis of peripheral nerves which must be explained by auto-intoxication, that is by products which have been produced in the body, as in gout, diabetes, leucaemia, scrofulosis, and malignant new growth, and have probably reached the nerve by the blood stream. Here again prophylaxis is powerless, and

paralysis cannot be prevented even by the most thorough treatment of the original disease.

Prophylaxis is relatively most effectual for peripheral paralysis caused by chronic alcoholism and syphilis, because in both these diseases we know of means by which these diseases may be cured, and thus can prevent the development of paralysis. There are cases, especially in alcoholism, less often in syphilis, in which the first sign of the mischievous effect of the poison shows itself in the nervous system, and the patient seeks medical advice only when the paralysis is already present. And then naturally prophylaxis of the paralysis is not possible.

For the various forms of peripheral paralysis the following special prophylactic measures are available—

1. Paralyses of the ocular muscles are in by far the greater number of cases of syphilitic origin, and their prevention consists in treatment of the syphilis. Prophylaxis cannot do much in the so-called rheumatic forms. And it is powerless to do anything in paralysis of the ocular muscles caused by intra-cranial processes. Neither is it possible to prevent paralysis of the ocular muscles after acute infective diseases, especially diphtheria.

2. The prevention of paralysis of the facial nerve consists above all in early and adequate treatment of all catarrhal and purulent inflammations of the middle ear. If we can prevent the pus from making its way through into the aqueduct of Fallopius, in most cases no paralysis develops. Sometimes the tympanic cavity may be so reduced in size by the simple catarrhal swelling of the mucous membrane as to compress the nerve and so to cause paralysis. For the sake of preventing facial paralysis the most trivial affection of the ear should be at once treated.

Rheumatic facial paralysis can be prevented by avoiding exposure to draughts. What was said above about paralysis from cold is true of this also—we do not know why the paralysis supervenes. We are unable to prevent traumatic facial paralysis, except possibly that which is caused by forceps delivery, where pressure of the blade on the child's ear may give rise to facial paralysis. But it is seldom

practically possible in these cases to prevent facial paralysis; mostly one is concerned about other matters at the time, and the facial paralysis is of less importance than the life of the mother and child.

Lastly, facial paralysis may be caused by swelling of glands in the face and neck, as by parotitis, or swelling of the submaxillary gland, and these conditions require suitable attention and treatment. There is no possibility of preventing facial paralysis which is caused by disease at the base of the skull.

3. Nothing can be said about prophylaxis of the rest of the cranial nerves—the trigeminal, glosso-pharyngeal, vagus, spinal accessory and hypoglossal—because paralysis of these arises almost exclusively either from trauma or as the consequence of other cerebral disease.

4. There is also no special prophylaxis of paralysis of any of the nerves coming from the cervical plexus.

5. In connexion with the brachial plexus, prophylaxis is possible in the case of the nerve to the serratus magnus, because paralysis of this nerve is very often caused by excessive overstrain of the arms, especially when raising the arms against some heavy weight, as in cleaning windows or in gymnastics. When possible all such movements should be avoided.

6. Paralysis of the circumflex nerve may be caused by a dislocation at the shoulder, and dislocations and fractures in this locality should therefore be very carefully treated. There are also cases of paralysis of the nerves of the brachial plexus which are connected with a rheumatic synovitis of the shoulder joint; this is possibly a neuritis produced by extension of the inflammatory process to the nerve itself. Here prophylaxis is of use, if the primary rheumatic process is early treated, and passive movements are begun as soon as possible in order to remove stiffness, and thus perhaps prevent the disease from attacking the nervous system.

7. Paralysis of the musculo-cutaneous nerve has generally a purely traumatic cause, so that prophylaxis is not possible. The question might however arise as to the advisability of

timely operative removal of glands and other tumours in the supraclavicular fossa, which might produce paralysis of the nerve.

8. Paralysis of the median nerve follows dislocations and fractures of the arm, and these therefore require very careful treatment. Sometimes it is caused by an unskilful venesection, as the median basilic vein passes very close to the median nerve. Lastly it may be caused by over exertion in many trades, such as among joiners, locksmiths, ironers and cigar rollers. For those forms arising from occupation prophylaxis is possible: the special form of over exertion should be avoided, especially when the trouble has already begun. We are powerless to do anything in traumatic nerve paralysis, caused by blows, stabs, or division, or in infectious forms, especially puerperal neuritis.

9. Ulnar paralysis is very often due to dislocations and fractures at the elbow joint, and prophylaxis so far is possible. Traumatic forms cannot be prevented except those caused by a definite kind of work, as in coalheavers. They are in the habit of carrying very heavy sacks of coal upon the shoulder, in such a way that the hand is passed up to the shoulder, and the elbow is enormously hyperflexed, and the nerve is thereby stretched and torn. It is the duty of hygiene to prevent coalsacks being carried in this way. Infective ulnar paralysis, occurring in the puerperium or after typhoid fever, cannot be prevented.

10. Paralysis of the musculo-spiral nerve is mostly a pressure paralysis from pressure upon the nerve at the place where it passes round the humerus. This nerve may be pressed at this spot even during normal sleep, and sleeping upon the arm should therefore be avoided; though this is not always possible because the position is mostly unconsciously assumed during sleep. Another class of compression paralysis during sleep is caused by alcohol, when the drunken man falls asleep with his arm upon the back of the chair, and it is quite probable that the poisonous effect of the alcohol has made the nerve specially susceptible to pressure. It can only be prevented if some compassionate fellow drinker removes him from this dangerous position, and this is

scarcely likely because of the want of knowledge of the danger. There is one form of radial compression which can be prevented: the so-called police paralysis, which is caused by the handcuffs put by the German police upon a prisoner's arm; these may cause compression by their pressure upon the nerves, which is generally increased by the resistance offered by the man.

In the axilla, the musculo-spiral nerve may be compressed by any kind of tumour, which should therefore be removed, or it may be compressed by bad crutches which are not padded or are too hard. This can easily be remedied. Diseases of bone may also cause paralysis of the musculo-spiral nerve, especially the callus produced in fractures of the humerus. Surgical interference is here needed.

The last kind of traumatism which may cause paralysis of the radial nerve, or some of its branches, is the subcutaneous injection of ether or some other drug into the extensor surface of the arm. If the needle is passed deeply it is easy to go through some nerve twig. Some care is always required in this operation: the fold of skin should be well raised, and the needle passed into this only. Toxic radial paralysis after typhoid fever, septicaemia, or in the puerperium, is like all other similar forms beyond the reach of prophylaxis.

Alcoholic paralysis of the musculo-spiral nerve is a rare occurrence, and its prevention consists in treatment of the chronic alcoholism.

The frequent lead palsies of the musculo-spiral may be prevented by avoiding lead poisoning; this is again the work of hygiene. But there are generally other causes also at work which cannot be known beforehand, for often when all precautionary measures for the prevention of lead poisoning are strictly carried out, lead palsy or some other manifestation of lead poisoning will develop; yet when these precautions are neglected, the lead may have nevertheless no injurious effects. Evidently some individuals are more liable to suffer from lead poisoning than others, and nothing can be done to hinder this.

11. Paralyses of several of the nerves of the brachial

plexus are mainly of traumatic origin, and prophylaxis is therefore impossible. An important question that may arise is whether any tumours in the supraclavicular fossa need be removed.

12. Paralysis of the muscles of the back and abdomen is in most cases the consequence of spinal disease which cannot be prevented, or of progressive muscular atrophy which also cannot be prevented.

13. The anterior crural nerve may be paralyzed by direct injury, and this cannot be prevented except in so far as it is caused by a hernia which can be treated by a suitable truss. It may also be paralyzed as the result of fractures or luxations of the pelvic bones, conditions which require appropriate surgical treatment; or it may be the result of disease of the spinal cord or spinal column, and for these there is no prophylaxis. Paralysis of the anterior crural occurring in the course of diabetes can only be avoided by adequate treatment of the diabetes.

14. The obturator nerve may be paralyzed by a large hernia through the obturator foramen, and can be avoided by surgical treatment of the hernia.

15. Paralysis of the sciatic nerve is mostly caused by compression of the nerve in the pelvis by some morbid swelling which occupies the pelvis and so diminishes the available space: such as a tumour, aneurism, a gravid uterus, or faecal accumulations. The paralysis can be prevented only in those cases caused by chronic constipation, and these are rare. Paralysis of the nerve may also supervene from inflammatory processes of the various pelvic organs, and may be prevented by treatment of the inflammation. Lastly, it may be caused by disease of the spinal cord, and this cannot be prevented. Prophylaxis is impossible in traumatic paralysis of branches of the sciatic nerve, the peroneal and tibial nerves.

B. *Spasm.*

Spasm is produced by irritation somewhere in the motor tract, most commonly by irritation of the central or the peripheral nerve tract. It may be produced directly by a

lesion affecting the nerve tract itself, or indirectly—so-called reflex spasm—when the lesion affects some other part of the body, such as an internal organ or an organ of special sense, and probably reacts through the sensory path upon the motor nerve region.

This great variety of ways in which spasm may be produced is a great difficulty in prophylaxis. The difficulty is the greater because in most cases the cause of the spasm and the nature of the nerve irritation are wholly unknown. A number of spasmodic conditions doubtless arise from some nervous predisposition, and prophylaxis of the nervous condition, as before described, will at the same time serve as prophylaxis of the spasms. Moreover we know of spasms caused by general disease, such as anaemia, cachexia, or conditions of exhaustion, in which the occurrence of spasms may sometimes be prevented by effectual treatment of the main trouble.

Muscular spasms caused by disturbances of the circulation, especially of the brain, by anaemia as well as by hyperaemia, may be prevented by preventing these circulatory disturbances as described above.

Chemical sources of irritation, as alcohol, mercury, strychnine, or lead may likewise cause spasm. Their prevention belongs in part to hygiene, and in part it is beyond the range of possibility, because they are the result of contingencies which are unavoidable.

Prophylaxis is most effectual in those cases where the spasm is produced by direct irritation in the motor tract in consequence of an injury, a scar, a new growth, or a dislocation. These should be carefully treated, and where possible be removed by surgical means in order to prevent the development of spasmodic conditions.

Occupation neuroses, which must also be included under spasmodic conditions, may be prevented if the excessive use of one group of muscles can be avoided. Prophylaxis is unfortunately not very effectual—I refer more especially to the occupation neuroses among musicians—because it would mean the relinquishing of the occupation, and this is possible in very few cases. Something can however always

be done to prevent these conditions, in which doubtless there is always some nervous basis, acquired or inherited, and an attempt should be made to treat this nervous condition and thus counteract the unequal muscular overstrain.

Among the occupation neuroses writer's cramp is important both with regard to its aetiology and its prevention. This condition is probably chiefly to be attributed to overstrain of the muscles used in writing, that is, by too much writing. But as this excessive amount of writing is generally necessitated by the vocation of the patient, prophylaxis can hardly be of use as it would mean giving up the work. But there are other factors concerned which are also important in the prevention of writer's cramp. Above all there is the method of writing, with pens which are too fine or too soft, paper which is too hard, a bad posture, or a bad penholder. These details should be attended to by all whose occupation compels them to write much. And further, writer's cramp may be produced by disease of the tendons of the forearm, by pressure of cuffs or shirt buttons on the nerves at the wrist; and all these conditions, if present, should have careful attention in order to prevent writer's cramp.

To prevent writer's cramp general treatment of the whole nervous system is very essential, for we know how often a general neurasthenic condition, either acquired or inherited, is the main cause of writer's cramp, although it is started by some purely external condition. Treatment of this general condition belongs therefore to the prophylaxis of writer's cramp. Lastly we must refer to excesses in alcohol and in tobacco, which help to develop writer's cramp, so that these should also be taken into consideration in prophylaxis.

2. Sensory Nerves

Neuralgia

A nervous predisposition is always an important factor in the development of neuralgia, and treatment of the general condition is therefore part of the prophylaxis of this disorder. No special remarks are required about this. Those forms of

neuralgia which are met with in various morbid constitutional conditions, such as anaemia, gout, diabetes and leucaemia, may sometimes, though not always, be prevented by energetic treatment of the constitutional malady. In other cases the prophylaxis of neuralgia is best accomplished by treatment of diseases in the neighbourhood of the neuralgia. As an example we may mention treatment of the organs of sense to prevent neuralgia of the trigeminal. Affections of the eye are specially important in this connexion, simple anomalies of refraction as well as organic disease of various parts of the eye; catarrh and suppuration of the middle ear; adenoid vegetations and catarrh of the nasal cavity; and disease of the frontal sinus and the antrum of Highmore should also be borne in mind. Thorough treatment and if necessary removal of these abnormal conditions are required to prevent the neuralgia. Lastly, every local disease of an organ may cause neuralgia by affecting the nerves which supply that organ or those near it, and treatment of the local condition — mostly of inflammatory nature — will obviously prevent neuralgia. Further details cannot here be given.

The direct causes which may give rise to neuralgia are those mentioned above as producing paralysis of the peripheral nerves. They are trauma, cold and infection. All that was said above about their prophylaxis is applicable also to sensory nerves, and need not be repeated.

The following special considerations refer to special forms of neuralgia—

1. Neuralgia of the trigeminal nerve. The prophylaxis consists in not taking cold and not looking out of the open window of a railway carriage when the face is overheated, and so on; and in the careful treatment of infective diseases. The effect of malaria is specially important and may produce attacks of neuralgia for years afterwards, which are often characterized by appearing regularly at a given hour and day. Trauma of the face requires notice, even a slight injury should be carefully treated and made to heal thoroughly, especially fencing wounds. The importance of diseases of the special sense organs has already been referred to. Every

eye trouble should be carefully investigated and treated. Much may be done to prevent neuralgia in later life if defects of vision are treated in childhood. In the case of the ears, earache should suggest examination of the ears, and aural discharge should be thoroughly treated. Chronic catarrh with secondary swelling of the mucous membrane requires treatment, and adenoid growths in children should be early removed. The teeth are very important. Their care belongs really to hygiene, but reference to them must be made because they often cause trigeminal neuralgia. It is quite certain that dental caries may reflexly cause trigeminal neuralgia, but this is not a reason why the sound teeth should be removed as well as the carious ones. The commencement of dental caries is very important in connexion with facial neuralgia, and early treatment of the carious tooth has prevented many a neuralgia.

Prophylaxis is almost helpless in tuberculous and syphilitic disease of the bones of the skull, and one can only suggest the necessity for the treatment of tuberculosis and syphilis. For tumours at the base of the skull, aneurism of the vessels at the base of the brain, and other brain diseases, there is naturally no prophylaxis.

2. Occipital neuralgia is most frequently a result of taking cold, often after having one's hair cut. Moreover it is particularly apt to set in as the result of chronic nicotine poisoning, as after much cigarette smoking, and its prophylaxis consists in the abstinence from excess of tobacco. Occipital neuralgia is also produced by disease of the cervical vertebrae or cervical spinal cord and membranes. Prevention is here naturally a difficult matter unless the process is syphilitic; if so, general treatment is required. Slight pains in the neck and trivial deviations of the cervical vertebrae from the normal should be early noted and thoroughly treated. Prophylaxis is powerless against the more serious diseases of the cervical spinal cord, such as tumours and other affections, which may give rise to occipital neuralgia.

3. Neuralgia of the diaphragm is rarely a primary condition, but arises from severe anaemia which requires treatment to prevent the neuralgia. In most cases it is the

result of disease of some organ which is in close relation with the diaphragm—the stomach, the lungs, the liver or the spleen—or is associated with the pericardium, and any real prophylaxis for this kind of neuralgia does not exist.

4. Neuralgia of the nerves of the cervical and brachial plexuses may be prevented by saving the arm from all overstrain at various occupations; for instance smiths, locksmiths, file cutters, turners, tailors and telegraphists. Very careful treatment is needed in all cases of disease of the bones of the arm and hand, in fractures and dislocations, because pressure by displaced bones is often a cause of neuralgia of the arm. In venesection great care must be taken not to injure the trunk of the median nerve, which runs close by the median basilic vein, for injury to it has often caused neuralgia of the median. Lastly, disease in the axilla may be a cause of neuralgia in the arm: enlarged lymphatic glands should be removed and aneurisms of the large vessels treated, should these conditions prove to be the cause. A supernumerary cervical rib may sometimes be the cause of a traumatic neuralgia of the arm or hand, and the possessor of such a curiosity would probably do well to have it removed for the sake of preventing neuralgia and paralysis.

5. For the prevention of intercostal neuralgia we can do but little. Often it arises from severe anaemia; if so this requires treatment. But generally it is a symptom of internal disease: of the pleura, heart or lungs, or it may be an early symptom of tuberculous or syphilitic processes in the ribs, or may be caused by spinal affections. Prophylaxis can do little in these cases.

Among the neuralgias in the lower extremity we shall only mention neuralgia of the anterior crural and sciatic nerves.

6. Neuralgia of the anterior crural nerve may be prevented by careful treatment of a hernia, by removal of enlarged lymphatic glands, and careful treatment of dislocations of the head of the femur. It may be caused by overstrain in trades, especially in turners and workers of the treadle sewing machine, and these points need attention. Lastly, it is present sometimes in diabetes, and its prophy-

laxis then is identical with that for the treatment of the diabetes.

7. Neuralgia of the sciatic is produced by an extraordinarily large number of causes, against some of which there is no effectual prophylaxis. Those cases are especially hopeless which are caused by serious disease of the pelvic organs, such as tumour, bony new growth and disease of the vertebral column. Prevention is somewhat more practicable in those forms which arise from gout and diabetes, and it may be prevented by suitable treatment of the original trouble. Sciatica which is caused by poisoning, for example by alcohol, lead, arsenic, carbon-bisulphide, may be prevented by the application of hygienic measures in trades and by treatment of the alcoholism. Those caused by cold can be prevented by care: we must warn patients against lying down or sleeping upon the damp ground or in damp houses, and against defaecation out of doors in bad weather, which is often a cause of severe sciatica. Traumatic forms may be prevented by avoiding excessive movements of the legs, particularly violent movements such as are often made when pulling boots on or off. The occupation in life may be concerned in the aetiology of sciatica in those people who are obliged to work much with their legs. Prevention of sciatica is most effectual when it is caused by constipation. The famous surgeon who said he would cure every sciatica by castor oil was hardly correct in making so general a statement, yet it is certain that sciatica can often be prevented by avoiding constipation. Lastly, we must draw attention to the intimate connexion between rectal affections and sciatica. Haemorrhoids often cause sciatica reflexly, and for this reason should be early and thoroughly removed. Moreover obstruction in the pelvic circulation, more especially in those of sedentary habits, may readily cause sciatica; this point also requires careful attention in this connexion. The prophylaxis of sciatica is thus not impossible for all cases.

D. THE PREVENTION OF FUNCTIONAL NEUROSES

1. *Neurasthenia*

The prophylaxis of neurasthenia coincides largely with the general prophylaxis of nervous diseases, as already stated in the first part. To prevent neurasthenia, we must guard against all injurious conditions which will make an individual neurotic whose nerves are still sound. This can only be accomplished by attention to his bringing up, his occupation, and all other conditions of life, and by the avoidance of every form of excess—points which have been already detailed.

A few points which are especially important for the prevention of neurasthenia will now be further discussed. To keep men from everything which tends to make them neurasthenic is quite impossible. There is no doubt that neurasthenia develops in our modern life in a way which formerly was impossible to conceive. But without this increase in neurasthenia we should probably not possess the thousands of improvements in our civilization by means of which we are able to procure advantageous conditions which we are then able to use to strengthen our nervous system. By hard work in very various branches of knowledge and science many men have doubtless become neurasthenic, but they and many others enjoy many advantages from the progress thus made. This advance of knowledge makes life easier, reduces the hardness of work and thereby directly tends to prevent nervous conditions. We should never forget this when one speaks of our "excessively nervous age," and compares it with the former quiet times. Look but at the highly developed state of our communications today. Certainly the electric trams which rush through our streets all day long and half through the night do not tend to calm the nervous system, and may by their constant movement and noise directly injure it, but on the other hand how greatly they facilitate travelling and make it possible for every workman to rest after severe physical work, and ride home for a few pence and thus be saved additional physical exertion when his work is done. Are

we then to get rid of electric trams to prevent neurasthenia? Certainly not. The same considerations are applicable to the telephone, that modern means of communication which is largely blamed for our neurasthenic conditions. How much easier and less trying have business communications become, and though perhaps it injures the nervous system by its unavoidable importunity yet it does very much more to spare the nerves and the strength. Many other similar examples might be adduced. I merely wished to show that there are certain sources of neurasthenia in our modern life which simply cannot be avoided.

The prevention of neurasthenia must therefore be sought in other ways. A careful bringing up of children may do very much. A few details about this have already been given. Here I would again point to the importance of teaching children early to be self controlled, to make them so far as possible insusceptible to external unpleasant and painful impressions, and constantly to keep before their minds the duty of being master of their own nerves. One should not constantly put before them pictures and scenes which will excite them. Much harm is done in this way, especially by letting the children see quarrelling between parents; the parents should set an example in self control. Strümpell truly says: children should never be allowed to hear the words "nerves" and "nervous." It is quite wrong, and will not prevent neurasthenia, if all the child's naughtinesses are slurred over with the excuse: "He is such a very nervous child."

To prevent neurasthenia, the measures earlier sketched out for childhood should be adopted: the body should be hardened by the use of cold water, alcohol should be strictly avoided, appropriate bodily exercise should alternate with mental exertion, sufficient sleep should be had, and all exciting amusements which are not suitable for children should be avoided; and other points already mentioned should receive attention.

The prevention of neurasthenia during the years of development is most important. So far as the body is concerned, great care must be taken to prevent masturba-

tion, and the thoughts should be diverted from sexual subjects.

In girls the hygiene of menstruation, especially at its commencement, requires attention. Many errors are committed in this matter, and the seeds of severe later nervous disease sown.

In later life it is more difficult to prevent injurious conditions. Theoretically one can demand that the hours of work be curtailed, and that regular intervals for complete relaxation be taken; but practically one meets with enormous difficulties in this matter. And yet it is a fact which no sensible man will deny that employés and many of the lower officials in the government service are often so severely burdened with work that they are quite unable to get the amount of recreation they need.

Certainly we must not forget that part of the blame belongs to the workers themselves, particularly in large towns with their many temptations. Instead of using his spare time—short as it is—for real recreation, the young man plunges into those nightly amusements which use up both bodily and nervous energy, commits excesses in alcohol, in nicotine, and in venere, and thus paves the way for neurasthenia. And many of our factory girls and saleswomen are not much more sensible. But though we recognize all this folly there is no need for us to be pessimistic.

Finally, we are helpless against those strokes of fate which cause neurasthenia. Anxiety and sorrow are indissolubly linked with our imperfect life; one has more, another fewer, but no man is altogether spared them. Nevertheless we can make the nervous system more capable of resisting the effect of such external impressions by avoiding other causes which injure the nervous system.

A few special causes of neurasthenia still need to be mentioned.

Firstly, it is important to avoid mental over exertion. I do not mean the regular mental work necessitated by one's work, though that work may be difficult—this by itself never makes a person nervous; but I mean the anxious work often done at night and associated with conditions of

excitement as to the result, as in examinations or prize essays. This is true of every calling: the speculator on the Stock Exchange and the diplomatist may become nervous through such foolish, forced, mental overstrain, just as does the ambitious scholar who is over anxious to make progress. It is the ambition which is the dangerous element. A man without ambition will never accomplish anything in life; but a man should never become a slave to ambition.

People who do much hard mental work must see that they do not overwork. Adequate bodily exercise is needed as a counterpoise; there must be intervals of rest from the work, during which the mind is allowed to rest entirely, or to recuperate itself through some easy work of another kind: fiction and poetry, theatres and concerts, are very useful for this purpose. One part of the brain must not be used to the exclusion of the rest. I have already several times spoken of the overwork of youths at school as a source of neurasthenia. There should be sufficient sleep: people who do much mental work need much more sleep than those who do hard physical work. If there is a desire for sleep after dinner it should be yielded to: one can best judge whether it has been good by one's feelings after such a sleep; but the afternoon sleep should never be long.

Neurasthenia may also develop as a consequence of general conditions of the body, especially after infective diseases and conditions of great bodily exhaustion left by severe anaemia, haemorrhage and prolonged wasting disease. An energetic and appropriate treatment of the primary trouble will do much to prevent an outbreak of neurasthenia later.

Lastly, we must emphasize the importance of excesses in the causation of neurasthenia. An excess of the pleasures which in moderation are inseparable from our civilization and whole mode of life, is often a source of neurasthenic conditions, and it is the duty of education to put a moral limit before educated men, which says: "thus far, but no farther." Unfortunately it is often the educated classes who set the worst example in the matter, and when we speak with a certain pharisaical contempt about the work-

man who has injured his nerves by spirit drinking, we must not forget the injuries to the nervous system brought about in the higher classes by champagne and gambling.

2. *Hysteria*

The prophylaxis of hysteria coincides with the prophylaxis for neurasthenia, and consists above all in guarding the child's nervous system from nervous disturbances by a correct up-bringing. It is so very important that children should be well watched in this respect, because there is no doubt that in hysteria hereditary taint is a far greater factor than in neurasthenia, and there is every reason why we should keep injurious conditions away from the child who is thus predisposed. We cannot enter into further details here, but must refer the reader to what has been said above.

One special form of hysteria, the so-called traumatic neurosis, requires special mention. How far is it possible to speak of prophylaxis in this?

The prevention of accidents is, as has so often been said, impossible. Against these prophylaxis can do nothing. But can it prevent traumatic neuroses?

Several factors are always combined in the production of traumatic neuroses. Generally there is a predisposition out of which the neurosis develops as a result of the accident; this predisposition may be a marked nervous hereditary taint, chronic alcoholism, or arteriosclerosis. These are conditions which cannot be altered; the chronic alcoholism alone may be stopped, though generally we have no opportunity of doing this before the accident has occurred. But in addition to these there is another very powerful factor, the pecuniary compensation. If there were no laws about accidents there would be no traumatic neurosis. The best prevention of traumatic neurosis would then be the removal of these laws from the statute book. That is obviously Utopian, but when we remember the great benefits which have accrued to thousands through these laws, the fact of traumatic neurosis is but a slight disadvantage though often a great difficulty to the doctor. And yet in certain ways

it is possible to influence traumatic neuroses prophylactically. One way is to fix a proper definite amount of compensation. In this the physician is much concerned. He must understand the peculiarities of these patients—and they form a class by themselves—and he must learn to estimate at their true value the complaints made by the patient, whose symptoms are mostly purely subjective. In this respect many mistakes are made by doctors. Let us assume it was an accident to the head without any external wound, without any sign of organic cerebral lesion: the patient has purely subjective sensations, headache, vertigo, lassitude, palpitation of the heart, in short a number of neurasthenic and hysterical troubles. After three months he is examined by the physician, and upon the result the compensation is fixed by the company. The physician gives it as his opinion that there is nothing objectively wrong, that the patient is therefore well, and the complaints are only imaginary and simulated. The result is the company decline to give compensation because no ill effects have followed the accident.

Now mental excitement is added to the condition above described: "I met with an accident, I have a right to compensation, but they refuse to give it to me." From that moment the man regards the company, the doctor and all the State as his enemies, and as Strümpell rightly puts it, covetousness is awakened. This covetousness leads to the well known hysterical, hypochondriacal ideas which refer every bodily sensation of discomfort to organic changes, and which refer all bodily deviations from the normal to the accident, though they existed long before the accident but were unnoticed. This may to a certain degree be prevented, if the patient is examined by a physician who understands such cases, and if he first receives adequate compensation which can always later be gradually diminished in amount. Experience shows that many patients are made perfectly content in this way, and have in the end become thoroughly fit for work again. The effect which the sudden withdrawal or reduction of the amount of compensation by the company, without previous medical

opinion, may have in the production of a traumatic neurosis must not here be discussed, because we have only to do with the medical aspect of the question.

I do not of course mean to imply that every case of traumatic neurosis arises in the way just sketched, and that it could be avoided in the way described. I wished only to point to one way in which it may arise, and in which it might possibly be prevented. The greatest number of cases of traumatic neuroses are caused by an accident in a constitution prepared for neurosis, and may lead to a want of energy and of confidence in one's own ability even though adequate or even full compensation has been allowed. We are powerless to prevent these cases.

The question arises whether by very careful treatment after the accident it would be possible to prevent the outbreak of a traumatic neurosis. This applies especially to cases of accident to the head. Statistics unfortunately give us no information about this, and we do not know whether in cases of severe traumatic neurosis the patient was adequately treated at the time of the accident or not, nor whether the patient commenced to work again too soon, and so on. In cases of head injury it is particularly desirable that the patient be thoroughly well treated, both bodily and mentally, and this is possible only in institutions. Perhaps many germs of traumatic neurosis might in this way be removed, and it were much to be desired that companies would be responsible for the treatment of these cases from the beginning.

3. *Epilepsy*

The prevention of genuine epilepsy, that is of those forms which begin in youth, is not possible. In general we can only say that where there is epilepsy in the parents and where there is a general neuropathic disposition, all measures should be vigorously pursued which make a healthy nervous system, in order that the epilepsy may if possible be prevented from developing. Prophylaxis can do somewhat more in so-called reflex epilepsy. Special attention must be devoted to any scar, especially about the

head, and these should in some cases be excised before any attack has appeared. Such reflex epilepsy may also be caused by a number of other diseases—affections of the organs of sense, of visceral organs and by worms; and the treatment of all these disorders is in a certain sense the prevention of epilepsy.

If epilepsy is already present prophylaxis can do much to prevent an attack, by the avoidance of all alcohol and of bodily and mental over exertion, and by moderation in everything.

That there is an epilepsy which develops as the result of chronic alcoholism is beyond doubt. Its prevention must lie in combating this abuse of alcohol. Similarly the prevention of forms of epilepsy which are the expression of a cerebral syphilis belongs to the treatment of syphilis. Forms of epilepsy which follow acute infective diseases, scarlet fever or typhoid fever, cannot be prevented.

4. *Migraine*

The aetiology of this disease is still obscure, and prevention is therefore very difficult. The disorder is markedly hereditary and develops in an inherited nervous disposition. Here too everything must be done to combat this tendency. There is probably some connexion between migraine and affections of other organs; but this is obscure. Certain nasal affections are said to be concerned in it, and it is probably wise to treat these in order to try to prevent an attack of migraine. Many women and girls who are otherwise perfectly healthy suffer from migraine regularly at the menstrual periods, particularly when they have been unable to take physical rest during this time; and this suggests the way in which prophylaxis may be sought. For the rest, prevention of the attacks seems mostly a question of individuality. The patient generally knows quite well what is likely to bring on an attack, and can prevent the attack by avoiding this cause. In some cases it is a cigar or one glass of beer more than usual, in others night work or a badly ventilated room. This can only be

learnt by the doctor from observations by the patient himself.

5. *Chorea*

The prevention of chorea is conceivable in those cases which are associated with acute articular rheumatism and are probably caused by the same virus. Theoretically thorough early treatment of primary rheumatic disease might possibly prevent the later development of chorea; but there is no statistical proof of this.

Cases which mostly appear at puberty and develop out of some general nervous predisposition should be treated by the measures appropriate for nervous individuals. My impression is that these cases mostly appear in children who have grown fast and have shown great ambition and industry at school. This rapid growth of the body and inadequate care of the mind, indeed often over exertion of the mind, are conditions which added to a nervous predisposition probably explain the development of chorea. These children need the greatest care, in accordance with the principles of hygiene already given. We are powerless to prevent those forms of chorea which are caused by some sudden fright or great mental excitement; all we can say is that the nervous system should be brought into such a condition by hygienic measures that it will be unharmed by these sudden occurrences which cannot be prevented. Prophylaxis is of course perfectly powerless to prevent those forms of chorea which are caused by organic brain disease, such as posthemiplegic chorea.

6. *Athetosis and Paralysis Agitans*

For athetosis and paralysis agitans there is no prophylaxis.

Prevention of Mental Disease

BY

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OF EMMENDINGEN

Prevention of Mental Disease

In order that this subject of the Prophylaxis of Mental Disease may be treated with the completeness which its importance justifies, we need to take a somewhat wider view than the exact meaning of the words would seem to warrant. We must not confine ourselves to a mere statement of the treatment which a specialist carries out in an institution specially adapted for the purpose; but we must first of all speak about the care of the mentally sound patient and consider that aspect of the question which confronts us before there is any need for interference on account of mental incapacity. The chief stress will be laid upon the word "prophylaxis" which includes both the preservation of health and the prevention of disease from becoming worse when disease already exists. But the former, the preservation of mental health, should always be our main object, and all should co-operate with us, whether in their capacity as members of the family or in some official position. Most patients who suffer from mental disease have acquired the disease; they were previously mentally sound though possibly with some predisposition to mental disease. This predisposition is extremely common though often latent, and no one can be quite sure in any given case that he has not to do with an incipient mental disturbance which his treatment may aggravate and develop further or may influence for good. Without wishing to overrate the importance of mental processes in the prophylaxis and treatment as well as in the development of mental disturbance, we must nevertheless take them very earnestly into consideration. In many cases we know that the mental disease begins to develop to some extent in a logical or at least a psychological manner, and that in the commencement the possi-

bility of and desire for cure appear, and that the mental failure is often connected with some external cause possibly brought about by others—all this is well known. One thing more: in a patient not yet mentally affected there are still at our disposal his personal consciousness, his normal sense, his normal power of association which is called up by his sensations and ideas; these are still undisturbed by any workings of his mind, which are more or less unreliable, are still unclouded by the shadows which may later govern all his thoughts and the form, extent and depth of his thinking; and we can still appeal to his memory and to his real judgment. At this time there is undeniably at least the possibility of good results being obtained by influences which are quite impracticable when the patient has become mentally ill. One cannot play upon a broken violin.

This prophylactic treatment of a mind which is still sound, can only be beneficial if the treatment is judicious and kind, if it is restricted within wise limits and not entered upon indiscreetly. The treatment should be in the hands of a doctor: in our opinion the "family doctor," who is best acquainted with the details of the patient's life. In addition to this special knowledge of the patient which we may assume he acquires increasingly from year to year, the family doctor has also a knowledge of the personality of the patient in the widest sense, and this is, if he understands his work, the most important condition for mental prophylactic treatment to be effectual. As the public learn more and more that many cases of mental disturbance cannot be cured by doing this or that, but rather by avoiding some definite thing which is the cause of the mental disturbance, they will more and more value this prophylactic treatment by an experienced physician and will necessarily turn to the family doctor.

It would be a national boon and a far-reaching prophylactic if we could more often again see the family physician in the old sense of the term, as the good and wise friend of the family—of course he would need to possess a knowledge of mental physiology and be able to apply it. This would

enable him also to guide aright and to moderate the zeal of those who come within his influence and are apt to fall into immoderation and over zeal, and he would be saved from the danger of overrating psychical causes of mental disturbance to the neglect of more important physical organic causes, and of falling into speculative illusions and trying psychologically to unravel processes which call for the helping hand of the skilled pathologist.

It is evident that mental prophylaxis in healthy people embraces a wide field and that an exhaustive account of it would be an encyclopaedia of the entire subject of the conditions of life and the relations of our being; the duties of the State would have to be discussed, questions of political economy, hygiene, social politics and religion would have to be gone into; indeed no chapter of pathology and therapeutics could be omitted owing to the inseparable connexion between body and mind. Such a presentation of our subject is impossible from want of space, neither is it at all necessary. It suffices if we bear in mind the close connexion between all the factors which influence our life and their influence upon the general condition of the individual, in order that we may maintain that attitude of watchful care which is the duty of the family physician, and if we constantly remember that the goal can only be reached through the co-operation of those who follow other callings in life.

In the following pages we shall consider those aspects which come to the front in the development of the individual, and we shall follow the natural course and begin at the beginning. We therefore first consider

General Mental Prophylaxis in the Healthy

From the nature of the subject, it will be impossible for us here altogether to avoid the mention of some things which really belong to special parts of the subject. It is impossible to lay the foundation for healthy mental life and to protect it unless we also know the morbid state, and we are compelled to look at both sides by reason of the large and important group of degenerates who re-

present the bridge between mental soundness and disease, and comprise a large section of cases of mental disturbance, and among whom some forms of mental disease are exclusively found.

Prophylaxis in Marriage

The results of mental prophylaxis are the better the earlier the prophylactic measures are adopted in any given case and the more comprehensive they are. The physical nature of the newborn infant represents an epitome of the physical nature of its parents, and if our prophylaxis is to affect the yet unborn child, we shall have to begin with the parents. The most important point here is an appropriate selection. This important matter, whose value for the future race can scarcely be over estimated, is generally disregarded to a dangerous extent. The public as a rule see the importance of getting a medical opinion only in those cases where there is already advanced disease in one of the two people concerned, or where it is known to exist in the nearest members of the family. In the majority of cases the fate first of the two people concerned and afterwards of a whole generation is made to depend upon purely material considerations, property and other utilitarian questions, or upon the voice of affection. The former method is generally blamed, the latter is praised. But both are wrong. Material considerations and financial selection have doubtless certain advantages which should not be valued too lightly: they shield us from many causes of mental disturbance which are most dangerous and a source of very serious mental harm. We need merely call to mind those disastrous emotions, anxiety and domestic sorrow. On the other hand, to follow one's heart is in reality only to let one's affections decide the matter and is equally selfish. The decision concerns children yet unborn, at least as much as the two who desire to marry, and therefore the interests of the children should be considered on altruistic grounds and all reasons for and against should be seriously and thoroughly weighed. In truth many a "commonsense marriage" deserves its name because it was undeniably the

PSYCHOLOGICAL SOCIETY

more sensible. Certainly in some cases the physical and psychical inclinations coincide with that which is biologically fittest, especially in those thoroughly healthy people who can safely do whatever is agreeable to them. But among that class of people who may still be considered healthy, the so-called degenerates, most hazardous mistakes are made with very mischievous consequences. And thus—not to mention the saying which we endeavour to follow: thou shalt not only multiply but improve—the standard of the race is often lowered, and the final result is to burden posterity still more heavily instead of lightening it. It is undoubtedly necessary that the aspect of the subject here presented should be more generally considered, and that a deeper sense of responsibility about these questions should be felt. This is mainly a question of education, and much of this will have to be done by the doctor whose work it is to prevent disease. Persons who are mentally unsound, neurasthenic, epileptic, hysterical, of peculiar character, passionate, melancholy, or drunkards, or persons who suffer from neuroses, disorders of metabolism, diabetes, leucaemia, or exophthalmic goitre, may transmit to their children some defect; those also in whose family history such disturbances have occurred, or those with tendency to apoplexy or suicide, or those belonging to families in which some are well endowed while others are decidedly inferior mentally, weak in intellect or with criminal tendencies—all such persons may convey to their offspring a defect in the sense of degeneracy. The degree of the degeneracy depends entirely upon the way in which it is brought about, that is upon the degree of defect in the parents. Marriage should not be entered upon by two, both of whom show serious defects; such defects are intensified when handed down to their offspring and are especially serious when similar pathological conditions are present in the parents, as for instance in blood relations. The prognosis is made worse when there is a great difference in age between husband and wife. Important prognostic hints are not seldom given in the similarity in temperament, intellectual gifts and external appearance with one or other of their ancestors, because

the ultimate psychical fate is surprisingly apt to be similar to that ancestor's. When the physician is thoroughly acquainted with every detail of the health of the parents, he is able to indicate the best way in which the future child shall be dealt with, fed and brought up.

There are slighter cases of degeneracy which demand careful watching and which may seem to become serious at puberty but which, if this critical period has not caused any well marked mental disease, improve remarkably rapidly, so that not only do all symptoms disappear but a kind of cure, if one may so express it, sets in. Possibly in speaking of such a man, the people use the popular German proverb about the Swabian who grows wise in his old age. It shows that in these cases marriage should be delayed, both because the dangers of over hasty attachments may be reduced or avoided and the prognosis for the future offspring will be considerably improved. We need not advise such a patient against marriage but only against early marriage. From reasons of prudence it is wisest to recommend this course rather than reply with a firm negative, and there is great scope for individual skill and tact in getting this delay. When the physician's efforts prove futile, partly because of the thoughtlessness of people, partly because these slight cases are so common, he has to accept the fact of a marriage which is not free from objections, and his duty now is to make the prospects as little unfavourable as is possible for the coming children. The degeneracy is mostly firmly implanted by collective past generations, but may also appear as the result of causes which arise afresh in procreation or which appear during intra-uterine life or even from later illness.

From time immemorial endeavours have been made to secure the best conditions for parents at the time of procreation: it is a part of the teaching of many religions and yet is often unjustifiably neglected. The more persistently therefore must the physician again and again counsel and warn. It is in itself unphysiological that an act which should be the expression of the highest healthiest feeling of energy should degenerate into an habitual function, often reluctantly

exercised, or into an outlet of some toxic stimulation; and above all it is dangerous for posterity, especially for those who, even apart from this, will have inherited a tendency to degeneracy and will therefore be less capable of offering resistance. It may be stated that, *ceteris paribus*, the accidental hereditary taint implanted by conception occurring during intoxication, is still more serious for the embryo of the degenerate than for the embryo of healthy parents. It has been shown that even a very small quantity of alcohol will unfavourably influence the psychical and physical organism, and the bad influence has been observed to act the more quickly and to be the more serious when there are already signs of degeneracy. It is the duty of the physician to teach that the parents should abstain from alcohol for a sufficient length of time before the act of procreation. What has been said about alcoholics applies even more emphatically to takers of morphine, for this poison takes even firmer hold of the cells of the organism than alcohol and causes more marked changes of the entire being. The breaking of the habit or recovery from the habit alone makes procreation justifiable.

We know of cases where the children born to a father after he had been cured of morphinism were healthy and strong and remained so, while the brothers and sisters born while this morphine habit was upon the father, though bearing family resemblances to the other children, yet showed signs of degeneracy, such as pallor, sickliness, nervousness, a neuropathic aspect, and chorea. The same remarks apply to all other similar habits of taking poisons, especially to the still more dangerous cocaine. Although tobacco and more particularly tea and coffee are comparatively harmless, we should nevertheless remember that all these substances may cause excessive stimulation in individuals with an hereditary taint.

Hereditary syphilis is one of the chief causes of idiocy or imbecility and of early paralysis, and especially of the paralyses of youth and also of epilepsy. In considering their prophylaxis, it must be remembered that the risk of infection being transmitted from the parents to the embryo is

the less the more energetic the anti-syphilitic treatment of the parents has been, and the longer the interval after the infectious stage, that is after the appearance of secondary symptoms. Specialists say that three years at the very least should elapse after infection before consent to marriage should be given. It must be pointed out that the opinion formerly held is erroneous, namely that a healthy embryo does not become infected if the mother becomes infected while pregnant.

For epileptic parents total abstinence from alcohol should be strictly enforced, for it can be shown that alcohol even in small quantities seriously affects epileptics ; it is indeed a poison which tends to produce epilepsy both in the drinker of it and in his offspring. Patients suffering from severe forms of epilepsy, with loss of consciousness, are unfit to have children. In the event of conception occurring, bromides often act well as a specific and do not injure the embryo. Flechsig's opium and bromide treatment is exhausting, and should only be used when the patient's whole time can be given up to the treatment.

It is known too that every general disease from which one of the parents may be suffering is unfavourable so far as the bodily development of the child is concerned. The effect of such diseases in the parent upon the psychical constitution of the child is less evident. Patients in advanced stages of phthisis may produce astonishingly healthy children, although in some cases the child is feeble. Descent from tuberculous parents seems to give perceptible psychical vulnerability which does not necessarily stand in any direct relation with any evident pathological and anatomical condition. Scrofula should also be borne in mind because of its mixed nature. It should also be mentioned that a phthisical woman often bears pregnancy extremely well, but afterwards, though not necessarily through the effects of lactation, rapidly declines. Chlorosis, or at least the predisposition to it, is hereditary, and marriage should be postponed or at any rate conception avoided till the chlorosis is cured. Often the birth of the child influences the case for good, and this may in part be ascribed

to stimulation of the organism by loss of blood and is a further proof that in some cases venesection should not be despised. It is most essential that a sufficiently long interval for recuperation should elapse between successive pregnancies, both for the sake of the mother and of her offspring, yet this is often disregarded. Evidence of former rickets should be looked for and inquired after, because rickets is often hereditary and influences the development of the brain and therefore of the mind. It may arise during foetal life, and may be a symptom of hereditary syphilis, but the main cause is improper nourishment of the infant. When there is a tendency to rickets, appropriate treatment of and a suitable diet for the pregnant woman may prevent much of the harm.

Malaria is not directly transmissible, though the general disturbance which it causes in the parent's constitution affects the embryo. In addition to quinine, which acts as a specific, a change of climate often gives excellent results and should never be neglected or postponed too long.

Finally, psychical hygiene can do much for the future offspring. Affection between the parents and tenderness in speech, a happy disposition, and good physical and psychical health are all favourable for their child. Even the choice of the time of day for conception may be important, and in doubtful cases can best be determined by the physician who has physiological knowledge and is acquainted with the case. The period following some physical ailment is unsuitable, lest the patient has not yet quite recovered from the disease; so also is the period during or shortly after some exhausting occupation, serious vexation, passionate emotion, and during or directly after numerous trivial events, such as ill humour, which are so apt to be met with temporarily in those tainted with degeneracy.

Prophylaxis during Pregnancy

Much that has been said about prophylaxis in procreation and which is essential then for both parents, applies also during pregnancy to the mother. If there is any well founded suspicion of syphilis treatment should be prompt and energetic. The foetus tolerates extremely well antisyphilitic remedies, such as mercury. When the exhibition of potassium iodide causes serious disturbance of the mucous membranes, and we are obliged to resort to atropin, we may do so safely without any fear of injuring the foetus. Often the conditions are such as to require the greatest discretion; and it is then best to give the mercury subcutaneously.

Bromides should be administered to a pregnant woman who suffers from epilepsy. It reduces the danger to the child both as to epilepsy and as to mental disease, and at the same time acts as a prophylactic against eclampsia, which is to be feared in the mother and which is also dangerous for the child, because it deprives it of oxygen. For the rest, all injurious influences should be avoided during pregnacy, and especially all sources of irritation which would injure the nervous system. The developing brain is in general more sensitive, and can therefore be more readily injured than can the developed brain of the pregnant woman, and the two are functionally more intimately connected than can be shown by anatomy. Fevers and infectious diseases appear greatly to irritate the embryo; this effect and the frequent abortion brought about thereby may be partly due to toxic products. Among non-bacteriological poisons, the effect of alcohol is especially bad, and the same is true of morphine; alcohol affects the future child by injuring the bio-chemical conditions, but well marked morphinism has been observed in infants.

Much will be gained for the future welfare of the child if it is possible, during the period of pregnancy, to ensure a calm harmonious disposition in the mother, and to guard her from injurious and excessive anxiety and care. The

morbid cravings of pregnancy may appear in degenerates as importunate uncontrollable ideas, and it is best to give way to them as far as possible instead of arousing irritation by attempting to suppress the craving, for the possibility of this is after all doubtful. Great importance is to be attached to the surroundings of the pregnant woman. It is undeniable that the tales of old women exercise a bad influence upon the mind of the pregnant woman, and may be the ultimate cause of a mental breakdown which will directly or indirectly affect the foetus, and the tendency, especially among primiparae, of allowing the mind to dwell constantly upon the expected event should be combated.

Prophylaxis during Delivery

During delivery gynaecological and obstetric measures are naturally the more important; still we should also endeavour to avoid everything which would upset the mind of the patient, and special as well as general precautions are required. A very long labour and great compression of the foetal skull are apt to injure the child's brain, and the physician should be prepared to prevent this. Without going into further detail we may state that in such cases the induction of premature labour may be indicated as a prophylactic for the sake of the child's mental condition. The obstetric difficulties referred to above are generally the result of former rickets affecting the mother's pelvis, and this is hereditary and often combined with little power of resistance of the brain, so that there is a double need of caution. It should also be noted that mothers who are not rickety but who are either very young or over thirty years of age have often difficult labours. The use of forceps offers the quickest method of ending labour, but has the disadvantage of compressing the child's skull, so that for the cases we are now considering extraction after version or Caesarian section is preferable. When syphilitic affections of the maternal genitals are present, the child may become infected during birth, if it is not already affected, and this should be remembered in order that necessary precautions

may be taken. Women who are in labour and are epileptic or have a mental taint or a tendency to eclampsia require the closest watching and should be under the constant care of the physician. An eclamptic fit is an indication to terminate the labour. Caution is needed in the use of chloroform as the poison is carried to the infant which is still attached, and it has been known to injure the child. If the child is born in a condition of asphyxia, it should be remembered that very drastic measures employed in attempts to restore respiration are not altogether harmless for the delicate nervous system of the child.

Precipitate birth may predispose to mental disease which may only become apparent some years later.

Prophylaxis in the New-born Infant

The infant must be shielded from a number of dangers which experience has shown threaten the first period of life. It may be rickets for which medical aid is sought. Hydrocephalus, which often appears with the rickets, is a serious condition, but there is the possibility of spontaneous cure, and when this occurs the increased space which has thereby been provided for the developing brain in the enlarged skull is not undesirable. The best treatment of rickets is not by drugs but by good food, fresh air, light, warmth, absence of damp and the avoidance of infantile diarrhoea. The mother's milk is the best food for the first six months, but when there is already an hereditary taint in the mother, it may be best, in the interest of both mother and child, to get a wet nurse who is mentally strong.

Congenital syphilis is the cause of the most serious forms of mental diseases and requires most careful treatment. The undeveloped brain, especially of rachitic children, shows a tendency to respond to peripheral sources of irritation by epileptiform convulsions: cold, improper diet, errors of the nursing mother, and later, worms and teething are the principal exciting causes. These infantile convulsions may be the initial stage of true epilepsy, or they may cease when the original source of irritation is removed; in the

latter case they may be regarded as reflex convulsions. But they are never physiological, and point to a certain weakness of the brain structure which the physician should note in considering the future of the child.

Prophylaxis in Childhood

Of secondary yet of sufficient interest to us are the infantile diseases in the narrower sense of the term: they are measles, scarlet fever, German measles, chicken pox, diphtheria, whooping cough and infantile paralysis.

Febrile delirium often appears during the course of these diseases, especially in degenerates, and should be regarded partly as the effect of toxic products, partly as a sign of exhaustion; in this respect it resembles infantile convulsions. This febrile delirium of childhood is not necessarily serious nor will it leave serious after-effects, but it serves as a danger signal, and the same is true of those temporary hallucinations, mostly visual, which appear not seldom in excitable children after strained mental effort, especially in the evening, and may be accompanied by a slight rise of temperature, though this increased temperature is quite insufficient to explain them. In scarlet fever we must bear in mind the danger of middle ear disease and of brain trouble.

Acute anterior poliomyelitis is of very serious prognosis; it may appear in the course of the infantile diseases named above. This and the somewhat similar cerebral infantile paralysis are a proof of the small amount of resistance possessed by the nervous system of a child. Both diseases show there is a tendency to epilepsy, though this may not appear till many years have elapsed. Paralysis following diphtheria is generally but not always of peripheral origin, and the prognosis is more favourable. Permanent motor disturbances are serious, psychically considered. Apart from the mere mechanical and psychical results of such peripheral irritation, a weak arm or a club foot must at least to some extent isolate the cripple from others, and this isolation will leave its traces even upon the

healthiest mind. A large number of cases of chronic spinal disease are hereditary and associated with psychical symptoms.

We must point out here that many drugs produce secondary after effects to which we shall later refer; idiosyncrasies in this respect are found even in children.

Prophylaxis during Mental Development

So far the prophylactic measures have all been indirect, because indications for them were derived from the general experience of specialists and from adults. We cannot obtain information to guide us by observation of an infant's mental life, for the cerebral functions are at first purely spinal, the sensations and innervations primitive, and there is as yet no mind. But its development begins at once and proceeds in normal cases with surprising rapidity, urged by a real thirst for knowledge of localization, and now the important task of the formation of the mind confronts the physician who has studied mental physiology. Details he will have to leave in the hands of the parents or of those who have the care of the child, but the final decision and supervision rest with him whose knowledge and acquired skill fit him for the task.

The human being at birth is in a condition of perfect helplessness, but even in utero he is capable of the automatic movements needed for sucking. Of the sensations, that of general sensibility first appears; the other senses generally show their presence through reflex acts, but are still undifferentiated. Although differences in the degree of stimulation are early felt, yet they do not pass into perceptions, and the mental process of association which later scarcely ever ceases during our waking life, is altogether absent in the infant. The child feels a stimulus or irritation, and responds to it by movements until the stimulus is removed or changed, whereupon the child makes other movements and thus learns to distinguish between those which are useful and those which are useless. These ideas

—at first quite primitive, since everything is new to the infant and only acts by stimulation—are the foundations for the associative process, for conceptions and for the process of the comparison of latent mental images (memory pictures). This shows how great is the danger that children who have not all the senses or who have not a perfect power of movement will remain mentally undeveloped. The further course of development is that more and more experiences are gathered, that more ideas are garnered and worked up by the process of association, that is by thought; selection by attention appears; a better and better arrangement of the materials for association becomes possible, indeed becomes a necessity; the consciousness of personality is evolved, and the organ of all these activities, the cortex of the brain, begins more and more to direct these. Next a number of subordinate functions appear, all under the supreme control of the brain, and later, when these are sufficiently practised after long habit to act as automatic centres, the organ of association is relieved by these automatic centres of activities which were originally purely cortical ones. The original close relation between stimulus and motor response becomes ever less and less intimate; emotions which appeared first as reflexes become more and more restrained by the increasingly developing mental processes—memory, perception, and judgment—and again those mental impressions which are really related are grouped together so that any overburdening is prevented, and thus our consciousness is not limited. In a certain sense it is therefore true that the main work of the cerebrum is control or inhibition.

Many of these activities are carried on as if by instinct along paths which seem ready for them, the anatomical conformation for which is doubtless inherited, and therefore special individual characteristics appear early which are full of meaning as regards prognosis and valuable as regards prophylaxis. For the deeper insight into the child's mind which is so full of fascination for the psychologist, a more advanced stage of development is essential, and a certain capability of expressing itself by language; in this respect

individual children show great differences both in kind and in degree, and this again is of prognostic significance. Extremes are met with among degenerates, and we must consider these more definitely. In these over sensitiveness or lack of sensitiveness early appears in many faculties; they have lack of balance, abnormal mental ability, pecular likings and aversions, and a high degree of suggestibility—these are qualities each one of which conceals within it the germ of a psychosis. We meet with similar conditions in the healthy; and for this very reason those entrusted with the care of the child cannot too carefully watch its psychical life and mental development, and observe all its peculiarities and idiosyncrasies for future guidance. Such study gives us valuable information about what has been termed the "psychical formula"; we should observe the special mental way in which experiences are noted, the feeling elicited by certain things, the appreciation of similarities, the association of ideas, the need of recreation and the method of recreation. For example, inattention is in many children only the result of a preference for remembering certain other definite things; in other children the preference for a certain definite line of thought, or the brooding over one thought; in others again it can be ascribed to a faculty for dreaming. Thus in the one case it is a sign of control, of inhibition, of the faculty for perseverance; in the second case also it is in part well founded; in the third case it is uncontrolled imagination, and of different significance as regards psychological cause, prognosis and prophylaxis. In the former cases, especially if the inattention tends to be repeated, our task is to relieve the cortical cells of associations and to restimulate them; while in the third case instanced we must check the tendency to dreaming and make the cells susceptible to the stimulus for logical thinking.

This analytical observation of the child will also give us an insight into the child's primary being; the spontaneous changes in association, by emotions, weariness, exhaustion, follow the easiest paths, the paths of least resistance, which are not always those made by the activity of thought and

may be very peculiar. These tendencies in specific directions, these individual peculiar associative paths, are of great significance, because they reveal a certain weakness and because, in various psychoses, similar habitual paths of association are followed which we must regard as founded upon a primary habit. Equally valuable and useful is it to note the way in which the memory of separate ideas alters in course of time, not so much an alteration in the quickness of memory or degree of memory, but a qualitative change.

We have been able only very briefly to allude to this, and point out the important deduction that observation must be individual and that the physician who is most skilful in making such observations will be best also at prophylaxis. Sympathetic individual treatment is more necessary for children than for others, and should be seriously undertaken. These spontaneous external manifestations, important as they are, yet do not exhaust the subject. We should endeavour early to wake the sense of self observation and the feeling of trust; for the child likes to cling to what is best for it. Confidence wins the child instinctively, and to one it will humbly offer as a gift what to another it resolutely refuses. The latter result may be brought about by obvious endeavours to compel, because children are sharp observers and reasoners. The exploration of the child's mind is an art which is difficult to practise and still more difficult to teach.

We must endeavour evenly and gradually to unfold the mental capacities, carefully guide the emotions, harmoniously adjust the receptive and active sides of the mind, and secure an equal all-round development of the mind by checking the tendency to overgrowth of some of the associative paths and by stimulating others which are being neglected. This is best accomplished by regular practice or habit, which makes it easier for the child and enables it to do more, and this evokes a feeling of pleasure which in its turn makes it still easier and more useful.

There are children who have primarily little power for comparison: the connexion of cause with effect has been

neglected by the mind. The organ of association left to itself becomes in a sense easily limited, not from any lack of ideas but from a confusion of ideas. There is a lack of logically thought out and well arranged mental material, and the capacity for purposeful concentration is reduced or wanting. Early training to correct this atrophic condition of association and constantly to stimulate purposeful thought will, thanks to the wonderful elasticity of the young brain, remove so to say these organic natural defects, so far at least as the function of the brain is concerned. This is true too of the tendency which exists in some children of "jumping to a conclusion," of inference through emotion, of exaggerated ideas connected with things pleasurable or unpleasurable. These are features which may be pathogenetic of paranoia and which have been already alluded to under the signs of degeneracy. To prevent such mental defects self criticism should be early encouraged; distrust should be implanted against the primary subjective pleasurable feelings accompanying these associative digressions and wanderings, and those feelings should be cultivated which accompany logical sequential thought; later this practice will be gladly pursued when an insight into its usefulness has been obtained, and will become a source of strength. Every association leaves its trace, and the previous association will influence the following one and to a certain extent will leave its impress upon it, so that prophylactically it is all important that we shall introduce new associations of ideas which will outweigh the old, and this affords further confirmation of the value of never ceasing effort and of constant watchful self control.

It is most important that these active voluntary mental processes, which may be termed internal activities, and especially attention, should always be accompanied by a feeling of pleasure. The development of attention in individuals is proportional to their intelligence, and it is therefore of the highest importance that the child should feel pleasure and so maintain and strengthen attention. On the other hand attention, like every other voluntary

impulse, is accompanied by a motor tension; and this shows the value of physical exercise, of the strengthening of the body, and of games in order that the will power may be increased and these supreme mental functions carried out. A healthy body is needed for a healthy mind, both in its entirety and in its various parts, and it is therefore an essential in mental prophylaxis.

These statements are called for here because they are of direct practical application in preventive treatment, and the sooner the treatment is commenced the greater will be its influence upon the mind and the whole life of the individual. We must however utter a warning against expecting overmuch from these psychological preventive measures. Nevertheless we may say that the further education of the child and the acquirement of knowledge would be easier and more successful, and that the school would be able more completely to accomplish its object and would give less cause for fault finding if it were possible to deal individually with every child during the entire course of its education and development, according to the outline sketched out above; that is if an educational method of mental prophylaxis were practicable throughout.

But this influence on the mind of the child should be begun very early, long before there is any question of its going to school. It is not necessary that the child should be taught anything at first, but only that some one should be occupied with the child, and it is therefore of the greatest value that when possible the mother who has brought the child into the world should understand what she can do.

The Prophylaxis of Education

1. PROPHYLAXIS IN TEACHING

A certain amount of elementary knowledge and certain elementary principles for the formation of character should already have been laid down before the child enters school. The work of the school is rendered more difficult by the

requirements of the school time table and the quantity which has to be gone through in a given time. This brings with it on the one hand the danger that the time required for the general training of the child is curtailed, and on the other hand there is the danger of over burdening and over-strain, most marked among the less gifted scholars. The division into classes according to the working capacity needs much thought, and it has been rightly said that this dividing up of the instruction given maintains the idea of the school as an organic whole and is of educational value. To prevent every injury from education is not possible, if we are to train up a robust capable race and not an effeminate one which would be unequal to any strain. But we must see to it that the school causes no permanent injury; and the loss of pleasure in work is a very serious loss, because of the limitation which it puts upon mental and physical work. Neurasthenia, hysterical manifestations, rapidly developed chlorosis accompanied by mental change, may be the result of an unhealthy strain in education. Moreover myopia may considerably limit the power of work, and bodily deformities—the important bearing of which upon mental activity has been already pointed out—do not grow less during these years. Headache, sleeplessness, apathy and nervousness are danger signals which should lead the physician to search for the cause without delay. Sometimes the cause is merely physical and easily removed; in other cases the school is partly the cause, not through any overstrain of learning but through an overwhelming dislike. There are scholars who pass through months of harmful emotions, of anxiety and fear—less often the fear of a severe teacher than that occasioned by rough school-fellows or even by one fellow scholar. The child is often ashamed of being afraid and says nothing, and the discovery is not made till the child breaks down, and a permanent reduction of the power of mental resistance is the result. There are schools in which systematic illtreatment occurs daily, and the victim is generally a degenerate whose bodily or intellectual peculiarities call forth this bullying; that is he is not a healthy child, though not definitely

ill, but one who may be looked upon as psychically handicapped and who requires the most gentle treatment.

It is obvious that these remarks are applicable also to the punishment of children. In the right use of punishments we have a powerful educational ally, a valuable mental prophylactic for the correction of any of those one-sided or excessive associations which have been already mentioned. What was there stated will give many a useful hint to school authorities and we will now add a few special suggestions. In order that this power of perception which we note in the child and which has in it the germ of genius may be fostered, well directed exercise and constant correction by the co-operation of adults are needed, and the scholar's facility for association should be guided by pointing to the connexions which exist between things. Any oversight or thoughtlessness must be very wisely and cautiously alluded to—even a "No" may often discourage a very sensitive child—and it can be best done by kindness and by a gentle allusion to some recent good work done by the child which will arouse again its desire to please. Constant comparison and wise repetition make this associative feeling of affinity more and more reliable as time goes on. Education to develop the power of comparison between objects observed is especially valuable. This associative power of classifying and sorting experiences is a security against the danger of distraction by the vast number of impressions received, and pointing out the ludicrous mistakes made in the hasty conclusions drawn by eager children is a very useful method of checking erroneous perceptions and of making the children recognize and value correct observation. Inattention is regarded as a mental endeavour to prevent overstrain, but it may easily do more harm than good. Moreover it must not be forgotten that the power of attention acquired through education in any given case corresponds directly with the stage of development of the inhibitory power of the brain, upon which the physician is obliged to base his prophylactic measures.

Attention requires that ideas which divert the mind shall

be excluded. These ideas must now be investigated. Often these disturbing ideas are so strong in association because they are not yet complete, not yet answered, because they contain a question. The adult can easily by his riper intellect supply what is wanting, and thus remove the excessive force of that train of thought. Often the child can be freed from this thought if he merely mentions it, and to succeed gradually in getting shy, timid, reserved children to talk is a great and rare gift; sometimes one single word spoken to a child will act with the power of a suggestion for a long time to come.

Observation of the power of work of schoolchildren will also give indications for psychical prophylaxis, and still more so will observations of the variations in the power of work, produced by mental influences, by new impressions, by the effect of work previously done, and by the interest shown in the work and in other things unconnected with the work. At the present time investigations in this direction are being eagerly pursued.

One of the most important prophylactic aims at school should be to keep alive in the child the sense of pleasure in work even though the child be liable to maniacal impulses, unregulated mental processes and overhasty action, provided only that the desire for self correction be equally marked. To be held up as an example, to have ambitions, should be encouraged; indeed one may even make use of certain little weaknesses, antipathies, and vanities, if thereby a higher object is attained which, by virtue of further possibilities which it promises, justifies the use of these means that will be put aside as soon as their work is accomplished. Praise rightly bestowed may be of value; a remitted punishment often accomplishes more than bodily pain. Homilies are mostly useless, and are then apt to lessen authority. So too to attempt to inculcate ideas of good and bad is useless. The child wants to see results, not to hear theories. For one who is developing, the absolute is not suitable. Neither is it of any use for the teacher to get angry. The result of his dealings with any given child should alone guide the teacher in his future course of action.

In every case it is essential to individualize, and nothing is more fatal to our purpose than the stereotyped schemes of education of the present day. It is not the amount of work done which deserves praise, but the amount of pains bestowed upon it. A little work may be far more deserving of praise than some brilliant performance, because it was wrought by one whose capacities were small and needed encouragement, while the gifted child is easily spoiled by praise. Individual acknowledgement of little efforts is also useful in those cases where we desire to arouse pleasure for receiving and learning something which is not agreeable. We can with care induce the child to do small things and thus accustom him to feel at home with them and grow to like them, if we are successful.

Purely mechanical learning by heart should be avoided: it removes the stimulus to valuable mental effort, is useless for the associative process, and therefore of no value in prophylaxis—indeed it may bring with it certain dangers, because it paves the way possibly for certain psychoses, especially catatonia. The teacher who understands his scholars, who is loved and yet feared, will best be able to do this work; indeed he will be unable to overcome certain difficulties if these relations do not exist. His word and example will have the force of suggestion, and will have the surest and quickest effect, because children respond very readily to suggestion. This is true not only of those children who are degenerates, but of every child not yet fully developed. To sum up we may say: school should continue and finish this prophylactic work in its psychological aspect; it establishes a normal tone of feeling; it develops a store of definite internal aids to association, and gives the capacity for logical thought and ideas.

Harmful conditions at school mentioned above, may suggest the thought that private instruction should be substituted for school. This requires very careful consideration, and the constant competition at school is certainly of great advantage, at least for boys. On the contrary, it may be necessary to remove the child altogether from the influences of its parents if these

influences are harmful. Not a few cases of overstrain with its evil consequences are the fault of injudicious ambitious, vain parents, and possibly at the same time very strict; more often, it would seem, the father is at fault than the mother. In other ways too there are many disadvantages in the training of a child by parents who lack judgement and are a prey to their passions: the influence and the example of the parents may be the direct cause of many a morbid tendency.

To arrange the time table of subjects taught according to hygienic principles would doubtless prevent many dangers. The subjects and work which are most exhausting should occupy the first hour of the day and the first days of the week; the afternoon should be free from any compulsory subjects; and there should be intervals between the subjects of increasing length, some days of rest, and short but frequent holidays.

The appointment of school physicians would be very useful. They would require special tact, or even diplomatic skill, and, in addition to all other medical abilities, a knowledge and understanding of the workings of the mind. The school physician will only really deserve the name if he is thoroughly versed in psychology.

2. SEXUAL PROPHYLAXIS

The work of the school is important and cannot be postponed, because while under its control the youth will before long be called upon to face the trying period of puberty.

Puberty generally appears and becomes established earlier in girls than in the male sex, where it is apt not to be fully established till about the age of thirty years. The sexual instinct however may make itself felt very much earlier; we do not mean the instinctive feeling for the opposite sex, but the instinctive response to sensual feelings. In small children, even in infants at the breast, co-ordinate onanistic movements may be observed. Often enough these may have been caused by unconscientious nurses who have used manipulations to quiet the child or

from sensual enjoyment; but they seem also to occur spontaneously, and the ease with which the tendency persists and the difficulty with which the habit is overcome, even after attention has been drawn to it and there is a willingness to obey, probably show that there is an unfavourable predisposition which requires greater attention for prophylaxis, and which often leads to precocious early signs of puberty in children whose genitals have thus been chronically stimulated. We shall again refer to this in speaking about degenerates.

It is extraordinary what a large proportion of the thoughts of almost all children of a certain age is given to sexual questions, chiefly because these thoughts have the attraction of the forbidden, because they are the fashion, and because the scholar who entertains them has the pleasant sensation of an inner independence of the members of the family who are apt to prohibit this subject. As a matter of fact these undesirable topics in children are much more rarely associated with sexual feelings than one is apt to assume. The latter are not generally felt till masturbation is practised, and this, in healthy children, has probably always been taught them by vicious example; in some cases it is wholly unaccompanied by any sexual idea. Both parents and teachers are to blame for the existence of this habit among elder pupils, so that those who might be expected to help in overcoming this bad habit are often incapable of helping.

Masturbation is always injurious, though in varying degree. It is abnormal in little children and becomes pathological after the period of "storm and stress," and when there are possibilities of intercourse between the sexes. In addition to the injury to the body, there is danger in the ever closer associative link between the natural impulse and its unnatural satisfaction. Moreover the feelings of remorse and dislike which constantly follow masturbation are highly injurious. The habit gradually becomes a want and finally is the only expression of the sexual life. There is no doubt that masturbation is a very serious cause of mental disturbance.

As prophylaxis the choice of uncontaminated companions is of the greatest importance. It is well known that bad habits learned at schools are frequently passed on from one generation to another. This is one point in favour of education at home. Every precaution should be taken before deciding to send a child to any institution: every possible inquiry should be made, and the ways of the inmates of the institution in question should be observed, particularly during their free hours. Here again the confidential physician of the family may be of great help. Then too one should watch the friendships which the child makes. If the influence is bad, it may be much wiser under the circumstances for one who understands how to deal with the child to use the opportunity for helping the child rather than adopt the simpler authoritative course of forbidding all social intercourse. For older children early sensible explanations are an important means of prevention. The influence of the parents is far greater than the influence of the school, especially at the age of puberty and in connexion with sexual questions. In any case the children do not remain mentally innocent; the book which we take out of their hands in fear is harmless compared with all that they hourly see at school. Our duty is to keep the child healthy—and we shall not be able to do this either by prudish or cowardly silence or by moral indignation, reproof and punishment.

In masturbation we have to deal with a morbid condition which has arisen in a normal way. Therefore the medical aspect is the only one we are justified in taking in judging and treating this habit. The physician is generally more respected by the school children than either parents or teachers, and for this reason he would seem to be the best able to help in overcoming onanism. Mentally considered the impulse to masturbation must be regarded as a one-sided function, an imperative uncontrollable idea; and the removal of this fixed idea is best brought about by introducing and strengthening other ideas and associations, by physical exercise which engages the mind, by arousing a desire for work which is in itself interesting, and avoiding sedentary

habits and solitary musing. It is much more effectual to build up the healthy mind in this way than to work upon the feeling of disgust which is always present in those who masturbate. The art of replacing the idea by another idea at the moment when the impulse to masturbation is felt is a far more hopeful method than that of relying upon the feelings of remorse which arise after having giving way to the habit. The tactics must be indirect; we can do very little against these excessive associative ideas, but rather we should cure the condition by raising the associative value of healthy ideas, constantly endeavouring to get the active co-operation of the patient. This point of view is important too in relation to hypnotism, and the method of suggestion, though very valuable in itself, must therefore be very carefully used. The details of the mental treatment must be adapted to each individual case.

Among drugs bromides are valuable, for they have a specific effect on the mind by reducing the condition of internal tension associated with these feelings. In allowing normal sexual intercourse for young people one must be extremely cautious because of the danger of infection; but in some cases it may be the lesser of two evils.

It may be mentioned that in doubtful cases it is well always first to think about injury through sexual perversion than at once to diagnose overstrain through education.

It can be shown that the heart suffers when there is excessive sexual intercourse, and affections of the heart are of some significance in the development of mental disease.

3. THE PROPHYLAXIS OF PUBERTY

Even when the age of puberty is kept free from any sexual injury, it may nevertheless be a dangerous period which shatters the mental constitution. The danger is greatest for degenerates, particularly for those with an hereditary taint, though it is bad also for a constitution with lowered vitality. A large number of such persons may suffer from the psychoses of puberty, especially those not protected by prophylaxis. This is the case with illegitimate children and

with children belonging to poor families, and to families not well equipped mentally; with children also of weak character, and those suffering from cardiac disease, chlorosis, anaemia; with young people who have grown very rapidly, or who are predisposed to phthisis; and with alcoholics. The best prophylaxis for this mental disturbance is to cure the diseases mentioned.

For this reason too we should try to put a stop to students' clubs, which are injurious to health because they shorten the night's rest and often lead to alcoholic intoxication.

The earnest attention and care of the physician who pays attention to prophylaxis are required during the time of the final examinations which generally come about the age of puberty. The best prophylaxis is that the instruction and work of the students should be so arranged that any special preparation for the examination is unnecessary; but even then there is the strain of the examination itself and the mental excitement. Here rational prophylactic measures, both domestic and medical, are of much value. They comprise regular meals of digestible food, sufficient rest at night, alternation of bodily and mental exercise, baths, gymnastics and massage. The functional activity of all the organs should be maintained, and a rational general management of the body avoiding all excesses and all over indulgence should be carried out.

Smoking, a favourite habit among students, should be reduced to a minimum; alcohol, which always and permanently reduces the mental capacity and injures the powers of observation should be discarded. Sometimes alcohol gives an inclination for work, but strictly speaking it will not be so well done as it would be done by a brain free from alcohol, though if the alcohol had not been taken the work would have remained wholly undone. Alcohol is not without value in inducing sleep, particularly during depression.

During the time these important examinations are impending, efforts should be made to prevent the associative life from becoming one sided and from revolving always

around the desired result and its dreaded difficulties. These thoughts must not constantly control the consciousness, and measures must be taken to prevent it if need be, and particularly if these thoughts are not free from overpowering emotion, which on the one hand lays firm hold of the associative activity, and on the other hand by paralyzing the attention necessary for other thoughts acts like a foreign body.

In girls puberty, with its many new organic sensations and startling sudden manifestations, exerts a still deeper influence upon the mental equilibrium, and to this are added the nervous changes during and after menstruation. Menstrual disturbances require attention although, in quite healthy individuals, they may be harmless. We take this opportunity to state that bathing is permissible during menstruation, though cold baths are often regarded as the cause of functional ovarian disturbances. Mental excitement during the catamenia is not free from danger, and this should be remembered at the present day when girls' studies have been so much increased.

4. PROPHYLAXIS DURING THE WORKING LIFE AND THE PERIOD OF INVOLUTION

The important step of the choice of a vocation should only be taken after well weighing the personal tendencies and capabilities and considering the medical aspect in regard to mental prophylaxis. The fact that a disposition, a mental weakness, is not necessarily always inherited but may also be acquired, that only a thorough personal knowledge of the person concerned enables us to arrive at an opinion as to what is advisable and what is dangerous, must always be before the mind of the confidential physician. He must understand the future vocation in its various aspects, and the prospects of success, he must estimate the amount of bodily and mental exertion required, and must point out the many differences in the learned professions between professional studies and professional life—in short he must act up to the limit of his ability as an arbiter between certain predilections and the hard realities of life's possibilities.

The student's life and still more the manner in which it

is often lived has many hidden dangers for the mind; this is true about the career of officers, engineers and various branches of mercantile life. Prophylaxis must endeavour to remove whatever is injurious in these vocations. The chief dangers are abuse of alcohol, bad hygienic conditions, and sexual infection—and for the student, injuries to the brain and overstrain at examinations through faulty arrangement of work. The careful selection of a university is of some value, because there are great differences between universities. In some universities excesses in alcohol and in fencing are the custom, and although severe acute anaemia may be often recovered from, yet it may sometimes lead to very serious consequences, even to the brain. For recovery after much dissipation the patient requires plenty of sleep and should abstain from alcohol, and this is the case too at examination times and while preparing for examination. Fencing, as a bodily exercise, must be regarded as one sided, and for the sake of prophylaxis it is much to be desired that the English games and sports could be more widely introduced. The hours of recreation are often more exhausting for students because of the abuse of alcohol than are the hours of study, and great improvements in this respect are needed for the sake of health. The intimate connexion between alcoholism and sexual infection is well known; and gonorrhoea, which formerly was regarded as a trivial disorder, may also engage the attention of the physician for mental disease, since cases of gonococcic meningitis occur.

The woman engaged in professional work is far less exposed to all these dangers, but her smaller power of work and of resistance make her more susceptible to the injurious effects of her calling. The woman's question will probably, as it progresses, set free the woman from certain fetters which have had the effect of preparing the soil for mental disturbances. On the other hand however there will probably be more numerous cases of cumulative inherited tendencies in future generations from the acquired injurious conditions of the parents. The woman has a smaller power for work, and it is especially dangerous if she tries to increase this by stimulants. Degeneration from the action of

alcohol, ether, morphine and cocaine, runs a very rapid and severe course in women.

Married life possesses certain incontestable prophylactic advantages. Longevity is greater among the married than among the unmarried, and the married man is less liable to the danger of mental disease than is the unmarried. But other factors also come in, and the conditions brought by marriage may be much more unfavourable for the woman, so that we must not expect marriage to act as a prophylactic in any individual case unless there are very good reasons for thinking so. The anxieties and excitement which are inseparable from the life of the married woman, pregnancy, childbirth, the puerperium and lactation, the loss of husband or of child, may all of them predispose to mental disturbance and even cause it; so that the question may arise whether in a given case it may not be better to avoid all these risks. The unmarried, on the other hand, miss a number of conditions which give rise to a feeling of security and peace, and are mentally satisfying and therefore prophylactic. The woman misses this organic sexual satisfaction far more than the man, because her sexual needs cannot be satisfied so easily in other ways; this difference is too firmly implanted in the nature of the sexes for us to expect any change in the future which would be of any prophylactic value.

For other details reference should be made to the section on Conception and Pregnancy.

The chief point in all these questions is the taking into consideration of all circumstances, that is of individualizing. The occupation of the person concerned may make it necessary that various prophylactic measures be taken which are appropriate to the case. Much that has been said in the chapter on Prophylaxis in Education applies here also. The danger lies in exhaustion through over anxiety and emotional strain connected with the work, and is ushered in by a feeling of excessive exhaustion; on the other hand monotonous work which is not done with pleasure is equally bad. The passion for advancement and restless ambition have a similar effect, and lead to con-

tinuous overstrain of the powers of work and are a source of future trouble. Even when a man's efforts have been crowned with success, and he is given some new, responsible and anxious work, it would have been better from the point of view of mental prophylaxis had he remained at his former work which was less responsible and less arduous.

From the psychological aspect, the principles laid down in the introduction about the prophylaxis of training apply also to later life, though it is obvious that the mind has then become more mentally complete and less capable of modification. This feeling of completeness often does not denote any real mental completeness and maturity, and does not prove that mental development is perfect, but is rather the subjective flattering conviction that the period for training has passed. Such a feeling of security is not justified and will cause the reappearance of those peculiarities in temper, judgment and power of decision which spring from inherited tendencies, and show lack of efficient mental association, tendencies the suppression of which was we saw the main task of early mental training. The worst enemy in this respect is emotion, which appears less often as age increases but is the more lasting when it appears. Therefore deficient self control will certainly lead to those enervating moods which enforce idleness because the calm quiet judgment required for activity has been paralyzed by the emotional life, the desire and power of self control are slain, and the individual becomes gradually insufferable, showing the signs of senile involution. We shall later see that the foundation of mental disease may be laid even during this period which is still definitely one of "sanity."

This neglect to discriminate and this preference for the subjective is a sign of increasing degeneration, and is promoted by certain poisons which it is customary to take. This is especially true of alcohol, the bad effects of which have been proved. Overstrained brain workers and those whose vocation allows of very little bodily exercise should be especially cautious. Nervous people, emotional people, convalescents, and inhabitants of the tropics should

abstain altogether from alcohol, the value of which, even in febrile infective diseases, has not been definitely proved. Alcohol injures chiefly the nervous and digestive systems : the majority of cases of chronic dyspepsia, which so often tends to cause neurasthenic conditions and indirectly to cause premature arteriosclerosis, have been produced by alcoholism. The previous family history of many who suffer from diabetes, epilepsy, neuritis and anaemia, or who have an acquired disposition to mental disease, shows that the same cause has been at work. Early senility is common among alcoholics. In every case it is better to begin to abstain from alcohol late in life than not at all. Alcohol may be discontinued suddenly without any ill effects, and it has been proved that the desire for it passes completely away in a few days, and does not return if the person is otherwise mentally sound. Only in a small minority of the cases of delirium tremens—which is never a result of withholding alcohol—when there is cardiac collapse, is it justifiable to go back to the use of alcohol in very small doses for a time. It is a very grave mistake thoughtlessly to order alcohol ; the physician should try to avoid prescribing it altogether.

The same holds good for morphine ; and the physician is not acting conscientiously if he hands over to the patient this drug or the hypodermic syringe. It is always well to remember in any given case that much abuse of this drug occurs without our knowledge or consent.

When there is a predisposition to mental disease, any bodily illness may cause it to break out. It is sufficient to point out that severe mental disturbance of a peculiar character is frequent in typhoid fever, pneumonia, influenza, variola, articular rheumatism, and intermittent fever ; and those patients are most liable to it who are weakened from any other cause, particularly an excess of alcohol. The convalescent stage of infective diseases also requires care. Syphilis in this connexion must also be briefly mentioned. Disease of the thyroid gland, of the suprarenals, and of the liver, may all be causes of mental disease, and thorough treatment of the original disease will prevent many a

psychosis. Disease of the organs of special sense requires very careful treatment, more especially catarrh of the middle ear, which is so common, and causes subjective noises that give rise to hallucinations. Certain drugs must be used with great caution, such as atropine, morphine, quinine and salicylic acid. Iodine, bromine and arsenic will in some cases, especially in alcoholics and those suffering from diabetes, produce nervous and mental disturbances, which may even pass into severe delirium. Many a delirium apparently due to fever is due to a drug. We should therefore begin with very small doses and discontinue these drugs as soon as possible.

The following general conditions are of importance in mental prophylaxis—a quiet contented business life and a happy family life, an income sufficient for the purposes of life, pleasant social intercourse, sufficient recreation regularly, and the avoidance of dangerous emotions, such as grief, sorrow and remorse. If a serious condition seems to threaten, the danger of mental injury may often be prevented by some simple measure, provided only it is adapted to the individuality of the patient. While in some cases complete rest is indicated, in others the mental balance may be preserved by increased duties. Some should be advised to travel, others are better at home. The work that made the patient ill may effect a cure if differently apportioned. A longer night's rest, overfeeding and massage will in many cases prevent nervous disturbances; on the other hand, one must be very cautious about the kind of amusements in which the patient indulges.

Obstinate insomnia may often be easily removed when the cause has been discovered. Hypnotics should not be at once prescribed, but an exact inquiry should be made into the daily occupation, and more especially the evening occupation, and all exciting factors must be removed. Instead of these we should recommend some easy mental occupation—translation, the making of epitomes, or drawing from a copy—according to the individual's taste, and this should be of brief duration and regularly alternated with rest in the recumbent posture and with gymnastics

which should also be of short duration. Singing exercises are sometimes useful instead of gymnastics.

Care of the body, both by gymnastics and by baths, is of extreme importance. Hardening the skin is of the greatest prophylactic value for the whole body; for it would seem as though accustoming the skin to peripheral stimuli produced increased strength of resistance against mental influences.

The climacteric and old age are physiological events of life. It has been shown that at these periods the individual is more liable to get mental disease, and greater care is therefore required at these times. The onset of senility should be kept away as long as possible, and its disturbing effects made as harmless as may be. For the former purpose the best means is an all-round hygienic life from youth upwards, the avoidance of alcohol and of work and emotions that are a source of worry. Arteriosclerosis is an important factor in the development of senile decay, and should be treated to prevent further inroads of the disease. A very strict diet to reduce the tendency to the deposit of lime and to cause excretion of the lime, together with large doses of potassium iodide, may be of use. The regulation of the gastro-intestinal functions and of the evacuation of the bowels is far more important even than in younger people. Diet and bodily exercise, hydrotherapy and massage of the abdomen often act rapidly, and should be tried in every case before laxatives are resorted to. Among the latter vegetable laxatives are preferable. It is most essential that they do not disturb the gastric functions. The first signs of senile degeneration may become manifest after some excitement, some great effort, or after infective disease, and prophylactic measures should be directed to these. Operations in advanced age are specially dangerous: certainly here too alcohol may be the main cause, and it has been shown that the delirium after cataract extraction is the result of alcohol.

Special Mental Prophylaxis

Whether a man who is perfectly well ever becomes mentally affected is still a contested matter and is difficult to prove. This at least is certain—that many of the injurious conditions mentioned above in the general section may lead to no bad effects, even though they are severe and combined with other predisposing elements; on the other hand the conditions of life are such that these very strong natures are fewer than formerly. It is our duty in any doubtful case to prevent mental derangement; yet this is very difficult in those cases of mental disturbance which develop without evident cause in one who seems perfectly healthy.

We are more familiar with the causes of those mental changes found in individuals whose conception, foetal life, birth and childhood lack all prophylactic care. They are indeed hereditarily tainted. Upon such a soil certain psychoses appear so exclusively that they have been grouped together under the name of degenerative. There are degenerative conditions in the narrower sense, namely, idiocy and imbecility, epilepsy, hysteria and neurasthenia, though among the last named very many are undoubtedly acquired; and lastly recurrent insanity, melancholia and paranoia.

Prophylaxis for Degenerates

Preventive measures may be used very early; this is the more easy because the family history often enables us to know with certainty that the child is a degenerate; moreover, pathognomonic signs appear early, many of which we have already named. Such children are often over sensitive to sense stimuli; this causes much agitation and increased irritability, disturbance of nutrition, of sleep, and of the general health, which still further reduce the power of resistance. Timely help is very necessary in these cases, otherwise the irritability and frequent uncontrolled emotions oppress the mind more and more. It is best to

let these children remain quiet, and to take them up only to feed them and wash them, and not to take any notice of their crying unless it is caused by some direct bodily condition; it is best also not to play with them, and they should be accustomed from the very first to sleep in the dark. Such a child will certainly remain a little backward through this treatment, but this will later be quickly made up, and it is most essential thus to delay intellectual development in degenerates. The greatest regularity of life is necessary, and punctuality for meal times and for going to bed must be insisted upon. Each child should have its own bed, both because it can rest better and because sexual excitement will thus be avoided. We must assume that the parents are intelligent and themselves free from disturbing elements, otherwise the doctor's efforts will all be in vain. Often it will be our duty to try and remove the parents' influence altogether when it is injurious, but this attempt often fails.

All over indulgence is especially bad for degenerate children, who are very apt to have a tendency to it. An attempt should be made to increase the mental power of resistance by strengthening the mind. One should not sympathize too much with them about bodily pains and wounds and illnesses, but cultivate an indifference to pain. It may be helpful to divert the attention, or in older children to appeal to their sense of honour. The children should early learn to do without things that they like, and should learn to renounce all that would be injurious for them. They may very early show a tendency to an almost uncontrollable preference for certain ideas: in these cases early mental gymnastic exercises should be used as prophylaxis against the insanity of fixed ideas. In every such case we must work calmly, intelligently and purposefully; the physician who understands the case will be best able to draw up a full plan for the treatment. Punishment is quite out of place for certain degenerates; and in no case should punishment be inflicted when under the influence of emotions. For those characteristic outbreaks of defiance and anger, which are without doubt morbid, the

child should be put to bed after a lukewarm bath followed by a little cold water; chastisement may do very great harm in these cases, and it also does them harm to laugh at them. The person who looks after them should guard himself against automatically completing the connexion between an unpleasant impression and an emotion of anger, which is so very close a connexion in most people.

In regard to diet, milk should for a long time take the foremost place; alcohol in every form, tea and coffee, should be altogether avoided. The food should be unirritating, digestible, nutritious, but not too plentiful; the evening meal should be frugal and without meat, but fruit is very good; it should be taken early to allow an interval between it and going to bed. The bowels must be attended to and care be taken that there are no intestinal worms. An anthelmintic may prevent serious disturbances.

The physician must meet the increased demands made by school life. Much has already been said about this in the general section.

A long night's rest is very important for degenerates and it must not be less than nine to ten hours till the period of puberty is reached, or till later if puberty appears early. The child should get up directly after waking in the morning. Other apparently trivial matters, such as the colour of the dress and the pattern of the carpet, may be of great importance in over sensitive degenerates. In one case it will be important to select neutral tints; in others to give preference to the child's favourite colour, for this colour will often decidedly improve the child's general mood, its condition and power of work. Regular cold ablutions and baths, gymnastic exercises, sensible games which the child likes, are of the greatest benefit. The question of diet must also be kept in view. The intellectual development of neuropathic children should be artificially delayed, otherwise they will be threatened with the danger of exhaustion and all its serious consequences, particularly those highly gifted children whose genius has grown up to some extent on degenerate ground. Here also restriction is needed, and we must insist upon frequent periods for

relaxation, although there may seem to be no absolute need for rest. The same course must be pursued in cases where a scholar suddenly gives way who was till then well able to work. This weakness may be temporary, but not seldom it is a sign that the bodily and mental power of development is at an end and will not yield to ordinary periods of rest. In these cases we must, for the child's sake, give up all idea of one of the higher vocations in life, and try to overcome the social prejudices felt against other more suitable occupations.

The sexual instinct may show a number of variations from the normal as regards the time at which it first appears and its strength and nature. Neither masturbation nor any of the other perverse habits is in the narrower sense characteristic of degenerates; but there is a special tendency to hold on to them if they are uncorrected by normal ideas. Here again a cautious selection of the surroundings is the best prophylaxis, and it must be pointed out that caution is not necessary only in boys' schools; there are also girls' schools where the traditions and mode of life have demoralized generation after generation of pupils. If the sexual feelings are over sensitive all stimuli must be removed, and it may even be necessary to separate the child from the other sex altogether. On the other hand seclusion and solitude should be combated by instilling ideas in a social direction—employment, work and active games. Bodily exercise is also very useful for timid children who lack self confidence: to increase self esteem often removes instinctive habits against which the degenerate is powerless. Hypnosis may also be useful: for the conditions and risks reference should be made to the general section.

The numerous other peculiarities of puberty are well known. In degenerates many of these may be combined and may possibly last beyond the developmental period. The best prevention will be a training psychologically arranged, but it should be remembered that mental self help is often to be found in some peculiar fancy. These very idiosyncrasies of puberty, which destroy the power of the ideas and of fancies connected with old associations,

are the surest proof of the degree of our success. If the treatment do not suffice, other ideas which also belong to this period of life may be accessory helps: the appeal to good taste, to the feeling of elegance, to courtesy, will all be of prophylactic value. Flirting and much similar nonsense will cease when it is recognized that it is not at all original, but a common everyday occurrence.

Reading may exercise a very baneful influence, and so too may religious questions which excite the imagination. Theatre going should in some cases be prohibited.

The care which is exercised at times of great physiological events and when making important decisions which bear on life, is even more necessary in degenerates. Moreover we must not seek to find a sovereign remedy in early marriage. The degenerate, especially when highly gifted, must be warned and guarded against overzeal and overwork at his vocation. Under some circumstances it may be of prophylactic value for the patient to live in some small town where there are few disturbing elements.

Experience shows that when slight mental disturbances have appeared with puberty, they are very apt to reappear with the climacteric in a similar form.

Malformations due to arrest of development in degenerates, which are signs of degeneration, may be the cause of many abnormal conditions, and in many cases operative procedures are then indicated for mental prophylaxis. But this is not the place for further details on this subject.

The transition from a mild form of mental disease to a severe form is similar to the transition from health to disease. Those measures required for marked degenerative mental disease do not belong to prophylactic teaching; nevertheless similar symptoms may temporarily be met with in those who are still sane, and we must therefore briefly mention their treatment, the more so because it is our duty to adopt measures which will prevent the case from becoming worse.

Emotional disturbances may be very successfully treated by prophylactic measures. The pathological irritability may, even when early training has been neglected, be

lessened by later training. First one should order a complete change in the life and surroundings, either letting the patient travel or go to a sanatorium, and guarding him so far as is possible from all emotions, especially from those which are painful. When his mind has become calm we may commence to strengthen it by regular mental exercise, beginning with quite easy exercises and leading it into other directions by definite objective work, always done for some purpose, and also by suggestion. Hypnotic suggestion seems less useful, but in some cases it may be recommended from time to time. This latter method of psychotherapy seems to act well in the more depressive forms of emotional disorders. Instead of diversion of the mind for these cases, some easy useful work, complete rest from work and much rest in bed are of value. Recurrence may be prevented later by a regular healthy life, with some pleasant occupation which brings with it no overstrain and, more particularly, no responsibility. In more expansive moods carefully regulated physical labour of longer duration is often curative. It should always be remembered that it is not the pathological permanent state of mind itself (though this is generally partly organic, or at least has developed so as to become chronic), but the many and oft repeated exacerbations produced by little upsets, unpleasant impressions often not owned to, and peculiar prejudices, fears and troubles, to which the cause of the mental affection is traceable, and a skilful inquiry into the history often therefore supplies us with very valuable hints for prophylaxis.

Uncontrollable ideas are a marked sign of degeneracy. The persistence, strength and predominance of these ideas leads to the insanity of "fixed ideas," which may be most troublesome and interfere with the work of life. Prophylaxis by training has already been mentioned. In these forms there is deficient power of attention; the inability to concentrate the attention may be the effect rather than the cause, and exercises in attention which are adapted for the individual, and objective and engrossing work according to a regular time table of work are needed. Under certain conditions hypnotism may act as a preventive. The bodily and mental

power of resistance must be increased and self confidence developed. When such insanity is fully developed it must be undone methodically, step by step, under the constant co-operation of the physician. Bromides and opium—the latter for the anxiety which is frequently present—may be helpful.

Secondary sensations are of some importance in connexion with this subject. These are sensory impressions, principally of the face, which arise at the same time that some other organ of sense is stimulated, appearing without any specific stimulus to call them forth and according to a regular law of gradation. Sounds more especially, but also taste, may be accompanied by a sudden mental picture of colour (*audition colorée*), the position of which in the spectrum depends upon the high or low pitch of the sound. The symptom is doubtless abnormal, but not necessarily of any bad significance. On the contrary, the secondary sensations may be of some prophylactic value if accompanied by a positive (pleasurable) tone feeling.

The Prophylaxis of Imbecility and Idiocy

The prophylaxis of imbecility and idiocy consists only in appropriate training. Weakness of intellect which is not certainly anatomical generally betrays itself very early by a bluntness of feeling and a want of spontaneous attention, and there need be no fear that a late recognition of the condition has delayed treatment by training. On the other hand in many weak minded individuals the power of development becomes lost in childhood, long before puberty is reached. There is therefore no time to be lost in making sure that a certain mental foundation is laid, so that when the time is reached when development can advance no further, the danger of mental retrogression may be prevented by constant repetition of that which has been achieved. In fact the education of the weak minded should begin at the latest in the fourth year of life. The prognosis does not depend solely upon the degree of defective intelligence; on the contrary, some idiots seem to be more capable of undergoing development within a narrow limit than imbeciles possessing greater intelligence. It

must be remembered that the capacity which a healthy child instinctively possesses for doing, observing and learning is very small or altogether absent in the weak minded, and must therefore be artificially developed. We saw in the general section that the capacity for and further development of voluntary attention was an indispensable requisite for mental development, and in cases where the tendency to spontaneous attention is stunted, mental acquisition may be impossible from the very beginning. Similarly we have to give up the attempt to call forth higher emotions and abstract ideas to aid us in our prophylaxis. Gratitude and attachment are generally wanting in the severer forms of imbecility. The characteristics which may be turned to account are the lively sensorial perceptions, the good memory which is often found in the more developed, curiosity, credulity, appreciation of music, of praise, of blame, of flattery, and of the fanciful. In some a certain fondness for the teacher, whose outward demeanour and appearance influence them greatly may be utilized, and the sensitiveness to bodily pain may also prove useful. The process of training must have reference to those simple and complex sensations which are the oldest psychologically, and therefore the more permanent through use; the formation of associations by practice in enumerating ideas which are associatively linked, and the frequent reproduction of these by drawing and by selecting an object or a thing which possesses those peculiarities from among things put before them; in this way ideas of and comparison between objects arise. Frequent repetition and practice in recognizing objects and in repeating their names are also to be employed. Along with this there should be practice in movements, in articulation, and in attention; aiming at some object, listening for some sound and looking for some thing are especially valuable. Games should be selected which fulfil the same purpose, and for the sake of future work in life their practical value should be kept before the mind. Anything which involves a complex mental process, the formation of conceptions which are not simple, or of general ideas, must

not be attempted till later. The gaps produced by the inability to acquire ethical ideas must be filled in by training. The idea of ownership, respect for another's belongings, for the rights of others, must be replaced by making permanently clear the close connexion which exists between deviating from what is expressly allowed and known and the discomfort which results from it; that is punishment which is felt and which must follow directly upon the wrongdoing, but in other respects may assume various forms. In the weak minded we must obtain automatically that which in a healthy individual could be obtained by the play of various emotions. From the very earliest youth violent emotional outbreaks must be treated as strictly forbidden in order to break the child of the habit.

The very bad effect of alcohol on the weak minded needs special mention. They appear always to be intolerant of it, and the pathological conditions produced by intoxication are a very serious danger to health and to the social community.

The greatest patience, devotion and, above all, self command are essential in the education of weak minded children. It is often not possible to get the appropriate treatment carried out uninterruptedly at home; and we should then not delay to suggest that the child be sent to an institution; in many cases it is advisable to do this from the very first. The efforts made are never valueless, and are of special prophylactic power against moral insanity. All men come into the world as moral delinquents, and a purely egoistic life is first passed through, but this is soon checked in the healthy and silenced by higher motives, and loses its strength, only however by the help of education. If education is not brought to bear upon the weak minded child, who is but slightly or not at all capable of gathering experiences, of making comparisons, and of forming ethical ideas, but on the contrary is filled by unrestrained passionate impulses; then often the patient is firmly gripped by this one sided moral insanity. But there is no doubt that all weak minded persons suffer to a certain degree from moral insanity; every emotional outburst seems to point to this conclusion. These

symptoms are all of them morbid, and their consideration belongs therefore to medicine. The principles of education of the weak minded are many of them still absurd, because they are unscientific. Only those methods which are adapted to the conditions of the mind are sensible and useful, because they act by way of prevention and thereby assure the future.

Prophylaxis in Epilepsy

The causes of epilepsy are closely related to those of degeneration and to all influences which lower the power of resistance of the central nervous system, and the prophylactic measures are therefore very comprehensive. Everything previously said about prevention is applicable to epilepsy also. A few special points however require emphasis. There is first the rule that the child of an epileptic mother should not be suckled by her. The convulsions which threaten have already been mentioned; when they appear in the first days of life they show lack of vitality in the child. It is always an indication for immediate treatment by bromides, and the treatment should be continued even when the attacks have ceased.

The nervous and emotional disposition should be combated, all mental and physical overstrain must be rigidly avoided, rough games, any gymnastic exercises which cause sudden concussions, as in jumping, fighting and corporal punishment, especially boxing the ears and striking the head should be forbidden. All stimulants must be strictly avoided, particularly alcohol, which may at puberty produce an outbreak of epilepsy. Masturbation is likewise a danger. If several attacks of convulsions have already occurred, it is best to recommend private education and very carefully to arrange the division of the work, and secure a regular life and much sleep. Under some circumstances treatment in an institution is best.

From the diet we should exclude all meat preparations containing many extractives, particularly soups. Hydropathic treatment, massage and electricity should be used to strengthen the body and to keep up the spirits. Among drugs most reliance should be placed

upon bromide, but it should not be used for long periods except under medical supervision. The earlier its use is commenced the better. We may commence with large doses, but should not as a rule exceed 2 drams a day. The best daily dose is about half this quantity; for children 45 to 60 grains, for adults 75 to 90 grains; the best preparation being Erlenmeyer's mixture of the potassium, sodium and ammonium salts in the proportion of 2, 2 and 1, well diluted. Great dilution with careful attention to the skin and the bowels is the best way of preventing bromide acne. In those who are intolerant of bromides, there is danger of poisoning if it is given in large doses for a long time; this danger is reduced by giving the moderate doses above mentioned. Flechsig's opium and bromide treatment, which is so very valuable in some cases, must not be used except under supervision in a special institution. First, for about six weeks, opium only is given, commencing with $\frac{1}{2}$ grain three times a day, and increasing it by $\frac{1}{4}$ grain every two or three days, though this depends to some extent upon the individual reaction to it; sometimes we can increase it by half a grain every other day. The maximum daily dose for an adult is 15 grains. Children under six years of age commence with a daily dose of $\frac{1}{8}$ grain, and the total daily amount must not go beyond 2 grains. In older children we may increase it to 5 or 6 grains daily, and in children over twelve and thirteen years we may give up to 10 grains. While taking these larger doses the patient must be confined to bed, and treated in every way as if seriously ill. The opium has then to be suddenly discontinued and replaced by large doses of bromide up to 2 drams in the day.

Bromine has the property of expelling the halogen chlorine out of the body, and its exhibition may be made more effectual if no chlorine is taken into the body, that is if no table salt be taken; smaller doses of bromide are then generally effectual. But this must depend partly upon the digestion, which should be kept in good condition. Otherwise the addition of table salt may modify the action of the bromide.

In reflex epilepsy and in Jacksonian epilepsy operative treatment may be undertaken to remove the exciting cause. Generally there are scars, and these should be removed if they are connected with epileptic attacks or with the aurá. The bromide treatment should be continued after the operation, even if successful. We cannot deny the fact that in some cases of epilepsy bromide seems to have little influence in curing the condition, and sometimes will barely ward off the attacks, but leads to a dreadful condition of stupor which accompanies those severe forms of the disease that we meet with in older cases. Nevertheless the specific value of bromide in most cases of true epilepsy is established, especially its prophylactic value in preventing the danger of an increase of the epileptic mental condition which threatens every epileptic and every child with convulsions. It is also of value in preventing the most serious peculiarities which are characteristic of epilepsy.

The Prophylaxis of Hysteria

Hysteria is, in a very large majority of cases, a sign of degeneration. Prophylaxis therefore consists in the preventive measures already recommended for threatening degeneration, and in the preventive treatment and training recommended for degenerates. It follows moreover that the cause does not lie in disease of this or of that organ, but in a morbid condition of the entire nervous system, and that to treat any one organ will be at best only to treat the exciting cause. Diseases of the generative organs are very apt to influence and impair mental activity in women, and these should be treated; but we should very carefully weigh the indications for any local interference, and we should avoid all meddlesomeness if we wish to avoid doing more harm than good. The outbreak of hysterical disturbance is most likely to occur after some great emotion, and it is obvious therefore how valuable a training is which prevents uncontrolled mastery by the emotions and strengthens self control. Even in adults much may still be done, and aggravation of the case be prevented by

adopting mental measures, by methodically practising calm self discipline, by cultivating objective interests.

Careful "waking-suggestion" is of great use, while hypnotism is good only for single symptoms, but tends to aggravate the chief trouble, which is suggestibility. The decisive factor in hysterical more than in any other patients is the power of the personality of the physician. An inconstant yet very marked suggestibility may be the result of many other influences, and in many cases therefore it is best not to allow the patient to be kept at home. It is then often seen that we have thereby deprived hysteria of one of its main supports.

We must earnestly caution against morphine. But an injection of apomorphine may sometimes have a good and even lasting result, and the remembrance of its unpleasant effect may sometimes act as a check to yielding to the inclination. Lastly, great care should be taken before giving the diagnosis "hysteria," because most of the laity ascribe to that term a moral rather than a pathological meaning.

Prophylaxis of Neurasthenia

Neurasthenia is common among degenerates, but occurs too in people who have no hereditary predisposition. It is a consequence of over stimulation, that is of exhaustion. In degenerates it is the consequence rather of a diminution of the power of resistance and of functional activity; in those not hereditarily tainted it is the result principally of irritating external relations. This gives us some insight into the prophylactic measures; on the one hand we must aim at improving the physical and mental strength of the individual, on the other hand at excluding all work which would do harm. For the former purpose we must point to what has already been said. Great stress should be laid upon keeping the young in good health. School life often prepares the ground for a later severe neurasthenia. All excess should be avoided in mental and bodily activity and in amusements: the life should be regulated, hygienic and quiet. Sufficient and regular sleep is of special importance. If nevertheless morbid conditions

arise, the exciting causes must be removed, and the irritable weakness and exhaustion must be treated, if necessary in an institution. But we must not be too ready to remove such a patient from home. In some cases the effect of removing the patient is bad, because it makes the illness public, and thereby reduces his control over these symptoms of illness and paves the way for hysterical impulses.

Masturbation is common in neurasthenia, and seems to be of some importance aetiologically. Certain pernicious habits in married life are especially injurious, but a regular normal sexual life may be of great prophylactic value. Overfeeding, the Weir-Mitchell treatment, massage, hydrotherapy, bodily and mental exercises, change of occupation and travelling, are all curative according to the nature of the case. The kind, patient and careful guidance of the physician, who so often knows how to bring the subjective thoughts of the patient into channels of objective interests, will succeed in getting many an order carried out and thereby ensure the greater certainty of success in the treatment.

Morphine must be avoided in neurasthenics, though opium is often indispensable in depressed states. While it is being used very special care must be given to the bowels. The diarrhoea so common after prolonged exhibition of opium will yield to tincture of Coto. Alcohol is specially dangerous for neurasthenics, because it gives a subjective feeling of improvement while it really exercises a very unfavourable influence on the main trouble. It is certain to cause progressive nervous disorder, and abstinence is therefore essential for the improvement of neurasthenia. We must point out also the tendency to suicide in many patients suffering from neurasthenia.

The Prophylaxis of Cyclical Insanity

The cyclical insanities, which were formerly regarded as purely emotional psychoses, have characteristic symptoms which usher in the attack. The attempt to stop the outbreak of the psychosis by atropine or by strong doses of

bromide (3 or 4 drams) offers but little prospect of success, but other measures adopted in time may prove of prophylactic value. Among these are rest in bed, careful diet and care of the body, the avoidance of alcohol and regulation of the amount of sleep, instruction of the attendant and special measures in regard to the morbid irritability, the motor impulses, and suicidal impulse; but in many cases the patient should go into an institution.

Prophylaxis against recurrence is important and should be early adopted. In regard to this experience shows that true melancholia or mania at the period of puberty points with great probability to a periodical recurrence, and that an acute onset and mild course make it tolerably certain that there will be an early recurrence.

The milder forms of disturbance are very common. In their mildest form they are more or less regular variations in the disposition, and probably remain within the limits of soundness of mental health. They can be treated quite well at home and yield readily to preventive mental treatment, which guides the motor impulses into useful channels by regulated bodily exercise and prevents any pathological aggravation. In severe cases of melancholia the patient should be sent to an institution, because of the very great danger of suicide.

Prophylaxis for the senile forms has already been given. The avoidance of alcohol, an hygienic life, pleasant occupations, and the maintenance of bodily vigour are of great importance. It should be noted that senile melancholia may show many hysterical features. The hypochondriacal preoccupation of the patient with his troubles should be overcome by constant kindness.

The Prophylaxis of Monomania

Monomania is characterized by the presence of systematized delusions and progressive illusions, and in the premonitory stages of the development of many of its features it may be influenced by preventive measures. In many cases of monomania these insane ideas cannot be traced back

to early youth, but there is an hereditary tendency to abnormal subjective conceptions which are little adapted to produce mental peculiarities that are beneficial. These children are of peculiar behaviour, distrustful, vain, and easily offended; they bear grudges, are haughty, passionate and incline to solitude, to dreaming and to flights of the imagination. In consequence of this there is very great danger of their forming impressions which are one-sided, subjective, and when the emotions are concerned even directly false, and of holding to these as fixed ideas. There is danger of their forming incorrect judgments, and of storing up memories which are correspondingly coloured; these are naturally lacking in justification, and have the peculiarity of fortifying themselves by new misconceptions. There is also a tendency to intuitive decisions as a result of incapacity for forming logical conclusions. The necessary conditions upon which monomania is based, the pathological increase of activity in conceptions and excessive prominence of the emotions in mental life, already exist in the temperament. But a well conceived psychological training may serve to check this tendency. We attach very special value to checking emotional moods when they are called forth by inadequate causes. The consciousness of having control over the emotions ensures a certain balance, even when the events are really disturbing. The emotion in its final expression becomes modified and repressed. This consciousness of self-control protects also from the feeling of mental isolation which is dangerous because irritating, and which unrestrained emotion always brings with it by reason of its one-sided origin, and still more by its subjective infective power.

It is very essential to remove the disinclination for social intercourse with others of the same age, but this requires very delicate and individual efforts. The many peculiarities often clung to with passionate tenacity can only be removed if we respect them and carefully avoid showing that we are trying to remove them. Moreover it is useful to arouse objective interests and to encourage these by work, although those who are predisposed show an extraordinary tendency

of mingling the most subjective ideas even with that which is farthest removed from them. These peculiarities continue to appear even in later life, and mental prophylaxis must not therefore be discontinued at any definite time; but calm judgement and quiet self control should constantly be practised, especially when irritating and anxious events meet us. Alcohol exerts the very worst influence in these cases, and may moreover produce certain features characteristic of monomania, more particularly the characteristic insane jealousy.

One must deal very cautiously with those affected with litigious insanity, whose illness may be considerably aggravated by unsuitable mental treatment, by transference to an institution, or by placing them under a commission of lunacy.

Reference must here be made to *prison psychoses*, in the causation of which solitude is a very important factor. It is particularly degenerates, epileptics and alcoholics who suffer from these, and an exact knowledge of the previous history may enable effectual prophylactic measures to be taken.

When there is marked mental disturbance prevention generally requires treatment in an institution; but the latter should often be avoided, and for inveterate cases when patients will not get reconciled to remaining in an institution, and are indeed harmed by the constant opposition, it is often useful to let them return to their home life. The object of prophylaxis must then be skilfully to wean the patient from his thoughts and to get him to take an interest in other things, and this is best accomplished by work which shows results and which requires the constant co-operation of the patient.

Prophylaxis in acquired Psychoses

The aetiology of some forms of insanity occurring in non-degenerates is obscure and hypothetical; this is especially the case in paralysis and dementia in the young. Other

forms, especially the insanity of myxoedema and cretinism, which possess many symptoms in common with dementia, are the result of diseases of metabolism, and we may therefore refer paralysis and dementia in the young also to chemical processes, to auto-intoxication. The causation of exhaustion psychoses and toxic psychoses is better known; their names explain their causes.

But here also several factors are at work. Exhausting influences, febrile diseases, the puerperium, lactation, haemorrhage, long continued night watching, disturbing emotions, and overstrain become very dangerous when several of them are combined. Especially common and dangerous is the combination of overstrain with anxiety and grief, and insufficient rest at night, and with these serious menstrual disturbances may often become associated. Medical prophylaxis may prevent much harm in these cases. Often unfavourable social conditions are at the bottom of it, such as certain conditions in domestic service to the irritating influences of which girls are exposed who go out to service in the early years of their development. It is very essential to keep up the bodily health and vigour in times of unusual mental strain and to get sufficient night's rest and good food. For those who are weak the English form of breakfast with its greater variety is much to be recommended; while the evening meal should be more meagre. After haemorrhage and after febrile diseases, the convalescent should be kept at rest sufficiently long to recruit his strength.

It must be again pointed out that alcoholism is a very important cause of the febrile delirium which occurs in the course of pneumonia. Different epidemics of one and the same infective disease show great differences in the prominence of some one or other of the bodily symptoms and also in the frequency with which they are accompanied by mental disturbance.

Insanity following myxoedema is the typical psychosis of metabolism and is a form of mental disturbance for which we possess an effective treatment. This consists in the administration of thyroid gland. The insanity of myxoedema

develops very slowly, and it is possible to prevent the severer forms of it by early feeding with thyroid extract. We should commence with small doses, 1 grain three times a day or 3 grains twice a day; the state of the heart's action must be carefully watched, and the dose must be very cautiously increased.

In cretinism we know what is the cause of the morbid bodily and mental condition and the method of infection, though the organized contagion is still unknown. The disease is conveyed by drinking-water and therefore clings to certain districts, especially those districts where there is an indolent people and scarcity of water which leaves no choice. But even under these conditions much may be done by way of prophylaxis. To boil the water will remove its dangerous properties; children do not get the disease till five or six years of age, and they can be protected from the disease by removing them early from the infected district; indeed even if they are removed later into healthy surroundings, an aggravation of the disease so far as it involves the mind may still be prevented. The early stage should be treated by thyroid extract.

The prophylactic education of cretins agrees in the main with much that was given in the chapter on imbecility and idiocy. Nevertheless these children show certain peculiarities which have to be considered: a certain timid submissive good nature is often characteristic of them.

Early dementia shows the symptoms of a psychosis in the narrower sense and also a number of other symptoms of disease which can be partly referred to intoxication, partly to local cerebral disease. Among the former symptoms are the sudden outbursts of excitement, the albuminuria, the increase of tendon reflexes, the excessive perspirations, the salivation, the occasional attacks of mydriasis; among the latter symptoms are certain fixed attitudes, the conjugate deviation and the Argyll-Robertson pupil. Early dementia is probably, like general paralysis of the insane, an evidence of organic brain disease, because even an intoxication may be primarily cerebral or nervous. For prophylaxis the physician will do well, in the present uncertainty as to the connexion between the

causes and the symptoms, to lay great stress upon the normal bodily functions and to take care of the general condition. It is of great importance to exclude all disturbances, such as those of menstruation, of pregnancy, and of the puerperium, and the gastro-intestinal functions must be kept in a healthy condition. If prophylactic measures have failed to prevent the disease, we must try to prevent the progress of the dementia. The best means is an occupation such as agricultural pursuits which have been so successfully developed in large institutions. It is important to utilize remissions, which may occur even in cases of advanced dementia; sometimes there are remarkable temporary improvements in the capacity for attention and sympathy, and these should be used at once for methodical endeavours to revive the old intellectual powers and to add new ones to them.

The best prophylaxis of general paralysis of the insane is the avoidance of syphilitic infection. When there has been syphilitic infection, we must urge the importance of a long continued and adequate specific treatment. We must warn against insufficient mercurial treatment.

There are however other additional exciting causes which sometimes apparently are enough by themselves to produce general paralysis; these are mental and bodily overstrain, alcoholism, tobacco poisoning, sunstroke and injury to the head. Prophylaxis must concern itself so far as is possible with preventing these injurious factors, particularly in one who is syphilitic. The general measures will be much the same as those for the prevention of neurasthenia.

In the case of paralysis it will be our duty to prevent paralytic attacks, the development of bedsores, and mental decay. The most important prophylactic as regards paralytic attacks is the careful regulation of the bowels. Bedsores can be prevented by care of the skin, cleanliness and constant attention. It is important to prevent all creases, breadcrumbs and dampness of the bedclothes; the position of the patient should be frequently altered so that he never lies in one position for long; he must be kept perfectly dry, an air or water bed should be used or a

permanent bath in which the patient may spend days. lying upon a stretched cloth; it is also well to allow the patient to get up occasionally if his general condition permit of it. Mental decay may to some extent be delayed and it is possible to prevent the unpleasant habit of incontinence of urine and faeces in some measure by regular evacuation of the bowels and by a skilful use of praise and blame.

The Prophylaxis of Chronic Poisoning

There is a great field for prophylaxis of mental disease in combating alcoholism. We have already often had occasion to point out its injurious consequences, among which in many cases we must include also so-called "tropical insanity." These consequences of alcoholism are as serious as they are numerous. Wise laws might prevent many of these injurious effects and in some countries are already in force as a prophylactic, not only against drunkenness, but more especially against the development of mental disturbances and the increase of crimes.

It is the duty of the physician to avoid the custom of allowing or even prescribing alcohol as a sedative, a tonic, to excite an appetite or to procure sleep; moreover he ought personally to abstain from it, and this is the more urgently necessary the more addicted his patients are to alcohol, because nothing so encourages the heedlessness of drinkers as does toleration of the drinking habit among those of the medical profession. On the contrary it is the duty of the physician to explain the deleterious influence of alcohol in every way, to plead for abstinence unceasingly and to support all undertakings whose object is the abolition of drunkenness.

In Institutions for inebriates it is important that the name of the institution should not in any way convey the idea of moral reproach against the inmates. Total abstinence, and not so-called moderation, will alone cure the alcoholic and prevent relapses. He who abstains does not feel the craving for alcohol, but the moderate drinker feels

it after the first taste. Therefore it is necessary to avoid this temptation and protect the patient from falling back into his weakness. It is very important that we should not hurt the feelings of one who has been cured, by unjustifiable distrust of his moral power of resistance. "Trust can alone create a sense of honour or restore it when lost" (Smith).

The temperance societies are of great prophylactic value, especially such as the Order of Good Templars. For those of weak character it is a duty to suggest that they should join one of these organizations for the sake of self preservation.

Morphinism has already been dealt with. It may be pointed out that doctors are chiefly to blame for the spread of morphinism and that they too have the greatest power to stop it. Except in an institution, morphine should never be given unless in the last stage of fatal illnesses.

The danger of relapse is much greater among those who have given up the habit of taking morphine than among those who have given up alcohol, because the craving for it lasts longer and returns with great regularity whenever great exertions, exhaustion, a feeling of depression or pain awaken a sense of need for immediate relief. The physician must be on the lookout for these conditions which create the appetite for morphine, but sometimes without any exciting cause the craving for the poison breaks out again, almost as an epileptic attack does, after abstinence from the poison for eight months or more.

The same remarks apply to cocainism, the effects of which are even worse.

Pellagra, with its polymorphic mental disturbances, scarcely belongs to this subject. It can be stamped out by prophylactic measures to prevent the grain from becoming mouldy and to prevent diseased maize from being used for food. Experience has shown that the alcohol which is derived from diseased maize produces similar injurious effects.

Poisoning by lead, mercury and carbon bisulphide are

common in certain industries and should be prevented by prophylactic measures. Perfect cleanliness and thorough ventilation are required in addition to the ordinary precautions.

Prophylaxis for Injurious Physical Conditions

In "caisson disease" to which men are exposed who work in diving bells under a high atmospheric pressure, the most prominent symptom in the majority of cases is acute paralysis, with but little prospect of cure. Here and there however delirium has been observed; the development of this may possibly be prevented by early and complete rest and the administration of sedatives.

In the tropics mental prophylaxis is chiefly required against the injurious effects of malaria, syphilis, alcoholism, unrestrained passions, and the high temperature. Heat apoplexy greatly endangers the central nervous system. Sometimes the acute symptoms are succeeded by violent motor impulses and subsequent complete forgetfulness. Heat apoplexy is somewhat common among the stokers on steamers in the tropics, and experience has shown that the work should be given up when there is evident danger of mental alienation.

It would be very valuable for the army if the army surgeons were consulted about the manœuvres to be undertaken during the hot season of the year.

The Prophylaxis of Symptoms

In the course of mental disease a number of symptoms arise which by reason of their disturbing and dangerous nature make us transfer the patient to an institution; but at the present day, partly because of the lack of judgment among the laity, partly because of want of room in asylums, these symptoms of disease often fall as a burden upon the household, and we have then not only to meet the threatened special dangers, but also the harmful influences occurring in the course of the whole psychosis.

The chief symptoms to be considered are refusal of food,

incontinence of urine and faeces, excitement and suicidal tendency.

Refusal of food may be the result of various mental causes: delusions, hallucinations, a feeling of unworthiness, negativity, general inhibition or weariness of life. Medical treatment must be guided partly by this. First one should wait a little, because a passing disinclination for food is common in mental disease and frequently gives way of itself to a regular desire for food. There are some patients who abstain from food again and again and eat so little in the intervals that increasing loss of strength reaches a very dangerous stage. These cases and those in which food is always taken in markedly insufficient quantity are the worst.

Here it is of great importance whether the patient drinks water or not. If he takes water, we may sometimes delay interference for some days, always however watching the state of the pulse.

In some insane patients the command to eat, spoken decisively, suffices to evoke automatic obedience. Other patients, the negativists, will eat if they are especially forbidden to do so.

While one will eat in company, following the example set by others, and will refuse to eat when he is alone, the very reverse will be the case with another. Sometimes it is enough if one particular person leaves the room, or if the patient is put into another bed or into another room. These often astonishing features are very common in early dementia, as well as in hysteria. We can sometimes remove the idea that the food is poisoned, by tasting the patient's food without letting him know what is the object for tasting it; but the attempt to remove the insane idea by persuasion or by explanations will almost always be in vain. If hallucinations or certain conditions of mental tension are the cause of the abstinence, an injection of morphine or morphine and hyoscine will reduce the mental obstruction and at the same time weaken the tendency to motor resistance; but it should be remembered that with many patients morphine regularly acts as an emetic. The property which hyoscine possesses of causing thirst by

drying the mucous membranes, may sometimes be of use, but it does not generally do any good in hallucinations and has no therapeutic value in a higher sense.

Feeding with the nasal tube should always be done by the physician himself. A soft elastic tube should be used, and having been oiled, it should be passed in through the nose; if one nasal cavity is too narrow, the other will be wider. No force should be used. If the tube goes into the air passage it often gives rise to no reflex actions in the insane, but it can always be known by the characteristic hissing of the respiratory air. It is quite enough if the tube has been passed so far that its opening is below the cricoid cartilage; food will then often flow better than if the tube is passed into the stomach. The food should be sweetened milk in alternation with soups, to which drinks containing fruit extracts may often be added. In case of need sedatives, wine and laxatives may be added. When the tube is being removed it should be drawn out quickly; the upper end should first be closed, so that no fluid which is still in the tube may get into the air passages when the tube passes the larynx.

Unclean habits are most radically combated by removing everything which the patient might use for unclean habits, especially the urine and faeces. There are cases in which regular injections and dry diet are unavoidable. With marked dementia this is absolutely necessary. Sometimes however putting the patient regularly on the bedpan is enough. Here again it is important to find out the cause of the uncleanliness. Again and again a negativist patient will refuse to comply when asked and directly afterwards will soil himself or the room, and the indication then is to forbid the patient to make use of the opportunity when it is given him or else directly to order him to soil himself.

It is noticeable too that the result in many cases is variable. Sometimes it is enough to let the patient remain with others or to let him be under observation, and he will not attempt to be unclean. Isolation is well known to be very fruitful in encouraging dirty habits.

Often chronic constipation is the cause of unclean habits, and the patient resorts to all sorts of manipulations because he feels uncomfortable. Removal of the constipation will here be of service. If the bowels are too loose a dose of tincture of opium every evening or an opium suppository is sometimes to be recommended. If uncleanliness is the expression of motor excitement the latter must be treated.

The idea that every condition of excitement is by itself the indication for its treatment will have to be considerably modified in an institution, because such a general application of this principle would be as unconscientious as the treatment of every rise of temperature by antipyretics.

Obviously one has to shield all mental patients from all irritating impressions; moreover mental excitement is bad for all neurasthenics and hysterical patients, and in general for imbeciles and epileptics and patients suffering from monomania. But whether it is well to check all the periodical attacks of excitement in those with periodic insanity, catatonia, or early dementia, by drugs, as is often done, seems to be at least doubtful. Instead of purchasing a momentary amelioration by weakening the brain by drugs and shortening the subsequent period of rest, it would from the standpoint of prophylaxis be far better mainly by expectant treatment to allow the irritated central organ to discharge itself and thus ensure a longer period for rest and recuperation. The indications for treating attacks of excitement when the patient is not in an institution are still more quickly and unconditionally given, and from what has been said there is still greater reason for regarding prevention as our main duty.

It is very essential that one should have a knowledge of the peculiarities of the patient and also of the art how to treat him. For this general rules cannot be drawn up. Above all it is necessary to exhibit the greatest patience and calmness to the patient. Earnest sympathy and veracity are needed to win the confidence of the patient, and this feeling of confidence will in itself act upon the patient so as to calm and be beneficial. On the other hand,

scoffing answers, a supercilious laugh, careless jests are inadmissible, firstly because they prevent the physician from being the sympathetic and helpful friend which he ought to be to the patient, and secondly because the slightest mistake in this direction will act upon the patient as perniciously as will a bad example. Many excited patients will be calmed if one will only listen attentively to them. Brief words of consolation, not too oft repeated, should be given to patients who are depressed.

General paralytics can generally be easily diverted, and from a state of violent anger be immediately brought back to a state of gentleness. The more mental personality that still remains, the more scope is there for individualized prophylaxis. In one case one can divert the thoughts and calm the patient by new sense impressions, in another by appealing to the memory or by setting some task, mental or physical, which requires some concentration of mind, and thus giving a quieting and useful turn to the originally purposeless organic craving for activity, and making the pathological symptoms instrumental for prophylactic and therapeutic purposes. An excellent way of checking a commencing irritation is confinement to bed, aided if necessary by baths or hypnotics. Warm continuous baths are often still more effectual. Both must however be carried out only under constant supervision, and the same remarks apply to wet packs. Everything which would suggest punishment must be avoided, though a sharper tone of voice used by the physician may sometimes be called for. About other details we must refer to what was said earlier. If more active treatment is needed, because of danger to the patient or his friends from his state of excitement, or to get him to the asylum, an injection of a mixture of morphine and hyoscine acts quickly and as a sedative in most cases. When the patient is calmed the physician will often be able to accomplish by skilful persuasion and by relieving the unpleasant hyoscine symptoms, what he tried in vain to do before.

The majority of patients resign themselves to the inevitable if one puts before them with friendly firmness the

necessity that there is for treatment in an institution. We should tell the patient that he is certainly ill and should let him know that his friends are of the same opinion, and in doing this we can sometimes usefully mention to him any dislikes he may have against anyone in his home circle, any ideas of persecution, and feelings of illness, and also that health will be most likely to be restored in a special institution.

If a suicidal tendency seems evident or even probable the patient should certainly be placed in an institution. It is necessary to determine whether in addition to depression there is also fear, because this emotion is apt to lead to the most dangerous surprises. Sometimes its presence is evident from the patient's appearance; in other cases we must ask the patient directly whether he has any fear, and if he says no, one should ask whether he has had fear, because this emotion appears not seldom intermittently. The inclination to suicide is generally confessed to by the patient; we need only ask him whether he is tired of life. In cases of hallucination and of dementia we have often to reckon upon a suicidal tendency. Certain conditions of rigidity often explode quite unexpectedly in the wildest and most reckless attempts at suicide. Patients suffering from depression act more purposefully: murderous attacks upon the attendant for the purpose of making suicide possible are not rare occurrences. It is strongly to be recommended that every patient suffering from melancholia, even if free from fear, should be looked upon as being as liable to commit suicide as an insane epileptic is to be dangerous to others.

Suicide can only be prevented by the constant presence of attendants. The patient's bed should if practicable be in a room on the ground floor; if this is not possible the windows must be secured. The door must be locked but should be able to be unlocked from outside. The patient must be constantly watched by a trustworthy attendant who should be exactly instructed; it is well to have regular changes in this watching. A second person should always be within easy reach.

It is very necessary that some alarm signal should be agreed upon. All dangerous objects which might be misused should be most carefully removed, such as knives, pieces of glass, cord and matches; the patients often conceal these. The bedstead must be carefully searched. If the patient covers himself over with a rug one must frequently look to see what he is doing under it. The arrangement of the room must be adapted or altered if necessary. The patient must not leave his room. Special arrangements must be made for ventilation, and only the upper part of the window should allow of being opened. A spoon only should be used for eating. In some cases an attempt may be made with plates and dishes made of baked dough. It is necessary to keep guard at night too; and sometimes it is advisable to give a strong hypnotic or a subcutaneous injection to keep the patient quiet till the morning.

It would be of far reaching value in prophylaxis if the government would make the provision for insane patients which the physician for mental diseases requires. Very much mischief would thus be prevented, many a psychosis would have a favourable issue, and the terrible increase in insanity would be reduced and thus give place to new and still curable cases. But the very best arrangements conceivable would only gradually modify the prognosis which now prevails that in most cases of mental disease the prognosis is bad. Until this state of matters can be changed by special treatment we must set our hopes upon prophylaxis and work at it with all our strength. If we are called upon to treat the disease therapeutically we find ourselves often enough unable to do it, so limited is our knowledge and power. On the other hand timely prophylaxis enables us to be masters in the treatment of the mentally sound. But it is not at all inconceivable that in the future—seeing the large number of degenerates who are a permanent danger to the community and the increasing over population of the country—the State will be compelled for its own safety and for the safety of the healthy to pass measures to secure the carrying out of mental prophylaxis.

The Prevention of Diseases of the Eye

BY

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OF STUTTGART

The Prevention of Diseases of the Eye

When I undertook the work of writing about prophylaxis in ophthalmology, I was well aware of the difficulties which would arise from this limitation and division of the subject.

The difficulty is very obvious when we consider what is understood by the term prophylaxis. In the wider sense it is the knowledge of the means by which we can protect ourselves against threatened disease; in the narrower sense that by which we prevent the results of disease already present.

This is upon the whole easy when we deal with a limited range of disease, or with some very definite group of diseases, or when we have to consider organs of relatively simple structure and simple function, as for example skin diseases and diseases of the sexual organs. But when the organ in question is so complex in structure and in function as the eye and its adnexa, then the work becomes decidedly more difficult.

In the first place it must be remembered that almost every kind of general tissue which is found in the body is found in the eye and its appendages: skin and hairs, mucous membrane and glands, striped and unstriped muscle, motor, sensory and sympathetic nerves, blood and lymph vessels; and consequently all organic and functional diseases of these structures will have to be considered under prophylaxis of the eye. To this must be added the structures peculiar to the eye which are met with nowhere else in the body: cornea and sclerotic, lens and vitreous body and their diseases; and lastly there are many functional

disturbances conditioned by the structure and use of the eyes which, without being diseases in the ordinary sense of the term, are nevertheless of great importance in connexion with the prophylaxis of diseases of the eye.

And this is not all. Prophylaxis may be of great importance under some circumstances when we have to consider some injury of the eye or some poisoning with its consequences. Neither must we forget that there are a large number of general diseases which bring in their train diseases of the eye and therefore require a special prophylaxis.

Moreover heredity and individual predisposition occupy a relatively important position especially in functional disease of the eye, and there are many physiological conditions of the eyes which under some circumstances require prophylactic measures. I will only here mention the injury to the eyes which may result from unreasonable use of them during the puerperium or during menstruation (particularly at puberty and the climacteric) although the course of these is otherwise perfectly normal.

Age has also to be taken into consideration in connexion with the prophylaxis of diseases of the eye: infancy and childhood require prophylactic measures which differ from those for adult life, and these again differ from those needed in old age. For these reasons it is quite impossible to limit prophylaxis of eye diseases strictly to "prevention of the various morbid conditions of the eye" in the ordinary sense.

The prophylaxis of diseases of the eyes, if it is to be useful, passes on the one hand far into the field of general prophylaxis, and on the other hand just as far into the field of general and special pathology; and because operations, injuries and poisoning from occupation have also to be considered, it passes also into surgery, the treatment of accidents and trade hygiene.

We have therefore to take into consideration almost everything which would have to be considered in the prophylaxis of the various diseases of the various organs of the body, and in addition everything that is peculiar to the special functions of the eye.

And there is still another difficulty to be overcome: to take venereal disease for an example, there is only one cause to be considered in regard to the causation of syphilis—contact with syphilitic virus, and only one result—namely the various manifestations of syphilis; while in diseases of the eye we find that on the one hand one and the same cause may produce the most diverse results, and on the other hand that one and the same disease may be produced by very different causes.

I will merely mention first as an example of organic disease that interstitial keratitis may be the result of syphilis, tuberculosis, rheumatism, gout, influenza or injury: and as an example of the consequence of functional misuse, that close work may, according to the disposition of the individual, give rise to spasm of accommodation, to myopia, to weakness, or on the other hand to spasm of the internal rectus, to retinal asthenopia, and ciliary neuralgia, and as a further consequence to conjunctival hyperaemia, to conjunctivitis with its secondary affections, and to hyperaemia of the optic nerve.

An inquiry will therefore embrace the following points:

1. How we may prevent diseases of the normal eye which arise (*a*) directly by injury either organic or functional; (*b*) indirectly by injuries to other organs. Under this category comes also the large subject of wounds, poisons, and trade prophylaxis, together with the prophylaxis of inherited morbid tendencies.

2. We have to consider how we may prevent disease which has attacked one part of the eye from spreading to other parts of it; for example how in disease of the lachrymal sac we may prevent its extension to the cornea.

3. Further how we may prevent the later sequelae of disease of the eye; for example how we may prevent the development of secondary glaucoma as the result of existing iritis.

4. How disease of other organs may be prevented from extending to the eye.

5. What must be done when disease of other organs has extended to the eye.

6. How we must act in reference to physiological conditions which may endanger the eye.

7. How surgical prophylaxis for the eye is to be obtained.

From what has been said the reader will see what great difficulties are presented even in the attempt to systematize.

Nevertheless I have endeavoured in the following pages to present the subjects of the prophylaxis of diseases of the eye systematically.

I am well aware that my system is not yet perfect and presents many defects, and that frequent repetition and references to other parts seem unavoidable; but I hope for indulgence seeing that a first attempt is never faultless and is always capable of improvement.

Classification of the Prophylaxis of the Diseases of the Eye

I divide the prophylaxis of diseases of the eye into—

A. General prophylaxis.

B. Special prophylaxis.

C. Prophylaxis at the various periods of life.

A. General prophylaxis deals with injurious conditions which act upon the eye and may produce disease of the eye, irrespective of the period of life, and without entering specially into the particular form of disease which may be produced.

B. Special prophylaxis falls into a number of subdivisions—

1. Prophylaxis in disease.
   - (*a*) Prophylaxis of the various organic diseases.
   - (*b*) Prophylaxis of functional disturbances.
   - (*c*) Prophylaxis of disease and functional disturbances of the eye which may arise in the course of general disease.
2. Prophylaxis in trades, accidents and poisons.

3. Prophylaxis in heredity.
4. Prophylaxis in operations.

C. Prophylaxis at various periods of life has to consider the differences in various prophylactic measures required to adapt them to the age of the individual.

A. GENERAL PROPHYLAXIS

General prophylaxis has, as above mentioned, to deal with those factors which tend generally to have an injurious effect upon the eye.

These factors may be variously arranged, either according to their effect or according to their nature. If we arrange them according to their effect they may be divided into two main classes: injurious conditions which in general produce only one definite disease, and injurious conditions which may produce various morbid conditions.

This arrangement is not however a practical one, because one and the same kind of cause may, according to the predisposing factor, give rise sometimes to one definite disease, sometimes to very different kinds of morbid conditions. It seems therefore more rational to base the classification not upon the effects but upon the causes, and in this chapter on General Prophylaxis to consider the effects only in the following way. Those aetiological factors which exclusively produce the first class of effects will be merely named here, but described in detail under Special Prophylaxis; while those aetiological factors which give rise to the second class of effects will be considered fully here, but under Special Prophylaxis there will be only a reference to the particular section under General Prophylaxis in which they are dealt with.

If then we consider the various factors from the purely aetiological standpoint, we find that they fall readily into three different groups—

1. Causes from without, that is causes of disease which produce purely local injurious effects upon the organ regardless of the general condition of the body. These may be subdivided into—

(*a*) Mechanical effects.
(*b*) Physical effects.
(*c*) Chemical effects.
(*d*) Infective and parasitic effects.

2. Causes from within, that is causes which are the result of general conditions of the body, partly physiological, partly pathological, and which produce injurious effects upon the eye. These may be—

(*a*) The general conditions of life.
(*b*) Physiological conditions.
(*c*) Heredity.
(*d*) Dyscrasias, general infectious and non-infectious diseases.
(*e*) Poisons.

3. Functional disturbances, that is injurious effects which are produced by definite activity of the eye beyond the limit within which it is capable of working physiologically. These may be subdivided into injuries which arise—

(*a*) From the way in which we work.
(*b*) From the kind and amount of work which we do.

1. Causes from Without

(*a*) *Mechanical Causes*

Mechanical injuries may, according to their intensity and nature, produce all kinds of pathological conditions, from a slight irritation of the conjunctiva up to complete loss of function of the eye or loss of the eye itself. We have here to consider all the causes which may mechanically affect the eye from without, beginning with the shorter or longer action of all kinds of dust and the entrance of small foreign bodies into the conjunctival sac and cornea, and thence to the penetration of the eye by foreign bodies moving with a great momentum; injuries with a sharp or pointed instrument and destruction of the eye by the effect of blunt force.

The nature of the diseases and injuries which may arise in this way will, in so far as preventive measures are possible, be considered under the special prophylaxis of the various constituents of the eye and under the prophylaxis

of diseases of the eye resulting from the occupation. Here we will merely say that foreign bodies which lodge upon the surface are the commonest cause of injury. Soot, dust, pieces of stone, small pieces of iron, powder, lime, ashes, road dust, insects' wings, or pieces of chaff from corn, get into the eye, and are fixed upon the surface or are pushed under the eyelid in closing the eyes. Fortunately these injuries are mostly insignificant, unless they produce infection by being allowed to remain in the eye. But those injuries are more serious and often lead to loss of the eye where the foreign body has penetrated the eyeball, or when the foreign body has been carried into the interior of the eye.

Though some of these are purely accidental causes, and could not have been avoided by the person who met with the mechanical injury, yet a large number of these injuries are avoidable.

Hermann Cohn found from an investigation of statistics of cases of blindness that 39 per cent. were caused by injuries received while at work; 21 per cent. were children, the greater number of whom owed the loss of their eyes to thoughtlessness when playing. The remaining 40 per cent. lost their eyes partly through direct assault, and among these were reckoned injuries sustained in war, and partly through causes which were scarcely, if at all, avoidable.

Prophylaxis against these mechanical injuries to the eye is obviously impossible for the last named 40 per cent. of cases. The 21 per cent. of injuries sustained through thoughtlessness and mischievousness, especially in playing, might be prevented by proper instruction. The matter is different in the case of the 39 per cent. of injuries sustained at work.

Prophylactic measures of a purely mechanical kind may prevent much harm: as, for example, the use of suitable protective spectacles while at work and the placing of guards around machines which are likely to endanger the eyes.

Details about this will be found in the chapters on special prophylaxis and prophylaxis against injuries in trades.

(*b*) *Physical Causes*

Three forms of physical causes have to be considered in prophylaxis for the eye—

1. Injuries produced by dazzling light.
2. Injuries produced by heat. And
3. Injuries produced by the action of electricity.

From their very nature it follows that these three kinds of injury cannot be strictly separated one from the others. Although light may often be only dazzling, intense light is generally combined with great heat; and the direct action of strong electric currents and electric discharges upon the eye generally produces intense dazzling and heat effects in addition to the specific effect of the electric current.

First we shall consider the prophylaxis of dazzling by itself; then the combined causes of heat and dazzling light, and electricity in combination with heat and dazzling light. The function of the eye is "to receive the ordinary characteristic ether vibrations which make the individual conscious of the sensation of light," and the sensitiveness of the eye for light stimuli is therefore extraordinarily great.

Fortunately the power of adaptation of the eye to the enormous differences in the quantity of light which it has to receive is also extraordinarily great and depends upon many contrivances. Not only does the pupil adapt itself to the amount of light received by dilating or contracting, but researches during the last few years have shown that the pigment layer of the retina also plays a large part in the power of adaptation. According to the greater or lesser intensity of light received by the retina, the retinal pigment wanders forward between the rods and cones or withdraws into the cell—sometimes surrounding the visual elements like a protecting mantle, sometimes allowing them to be freely exposed to the effect of the light; moreover the bleaching and new formation of the retinal purple is also probably concerned with adaptation. But this power of adaptation has its limits, both absolutely and relatively.

The absolute limits are the minimum of light required to make the eye physiologically active, and the maximum of

light admissible which will not impair the physiological activity of the average eye. The relative limits depend partly upon the subjective sensitiveness to light of the individual, partly upon the power of resistance possessed by the eye of that individual, partly upon the power of adaptation to variations in the illumination within shorter or longer periods of time.

If the eye is not to be injured, the illumination must not fall below a certain minimum nor rise above a certain maximum; and further, an eye not accustomed to intense illumination can only bear a lower maximum of light without being injured by it than can an eye accustomed to stronger illumination; and on the other hand an eye accustomed to a certain quantity of light may find a minimum uncomfortable, though another eye accustomed to work with but feeble illumination may find this minimum not directly harmful. Moreover rapid variations in the intensity of illumination may be injurious, although the maximum and minimum limits for that individual eye are not passed, if these differences in illumination follow one another rapidly and suddenly.

In the question of the effect of light upon the eye we have then to consider both "too much" light and "too little" light.

The present section has to deal only with "too much" light, particularly when the excess of light is capable of producing rapid anatomical changes giving rise to serious visual disturbances. The slighter degrees of dazzling produced by sunlight, or artificial illumination will be mentioned under the prophylaxis of functional disturbances. Injury caused by deficient illumination will also be dealt with there.

In considering the consequences of too intense illumination of the eyes two factors need to be borne in mind, namely the results of too intense an effect by the visible rays and the result of excessive action of the so-called invisible rays—the ultra red and the ultra violet rays. By the term "dazzling," used in the narrower sense, we mean the excessive action of the visible rays only upon the retina.

The ultra red rays are absorbed by the aqueous and vitreous humours; the ultra violet are mostly kept back by the refractive surface of the eye and by the lens. The visible rays alone pass in almost undiminished strength through all the refractive media to the retina.

If the retina is illuminated by too intense a light, especially by sunlight or the light of an arc lamp, the spot where these rays are focussed upon the retina becomes considerably altered, and this is probably due to this spot being more or less burnt. In severe cases the structure of the retina may be completely destroyed. The subjective symptom of this process is the appearance of a dark speck which gives the patient the sensation of a positive scotoma. In mild cases the power of vision may gradually be completely restored; in severe cases the dark speck is permanent, and in the severest cases there may be complete blindness. The disorder is most frequently met with at the time of a solar eclipse, because individuals, not knowing the danger, endeavour to observe the phenomenon without adequate protection. These cases of dazzling are also the consequence of the foolish rivalry, especially among children, of looking at the sun as long as possible with the unprotected eye. The disorder has also been met with in people whose occupation includes the regulating of arc lamps, or who from want of care or from ignorance of the danger intentionally look into the light of an arc lamp for a long time with unprotected eyes.

The most important prophylactic measure is naturally to spread as widely as possible a knowledge of the dangers which are associated with the direct action of sunlight and of arc lights upon the eye.

If one is obliged or wishes to look at the sun or at an intense artificial light, especially the arc lamp, then as a prophylactic against being dazzled by the sun, the use of smoked pieces of glass or of several pieces of complementary coloured glass should be recommended. To protect against the action of an electric arc light, it suffices to wear protective spectacles of the darkest tint, or even better to use complementary coloured glasses.

This dazzling by visible rays must be sharply distinguished from that by the invisible rays. For while the visible rays act upon the retina, the invisible rays act principally upon the protective organ of the eye and the anterior segment of the eyeball.

The ultra red rays play only a small part in this, and if allowed to act upon the eye will set up an immediate but trivial irritation which will disappear in a few hours. The ultra violet rays on the contrary have this peculiarity, that their effect is not felt while the rays are acting upon the eye, but after the lapse of some time, generally several hours, a severe irritation of the conjunctiva, cornea and iris sets in, which may last several days.

This form of dazzling occurs in snow blindness and in inflammation of the eye caused by electricity. The characteristic of this form of disorder is that the symptoms of irritation of the retina are only an intense photophobia, which is produced less by any direct lesion of the retina than by severe symptoms of irritation in the region of the anterior section of the eyeball. Inflammation of the eyes caused by electricity may sometimes be combined with a true dazzling in the narrower sense. It is not within the scope of this book to say more about this disorder and its causes.

The prophylaxis against snow blindness is to wear "snow spectacles." These spectacles should have very large grey smoked glasses of the shape of a mussel shell. The glass itself has the property of holding back the ultra violet rays, and need not therefore be very darkly smoked.

To prevent inflammation of the eyes by electricity protective spectacles of the very darkest kind of glass must be worn, because here we desire also to hold back the visible rays.

From the action of the ultra red rays of light upon the eye we must distinguish the effect of heat upon the eye that is the action of the higher degrees of heat.

Apart from direct burning, in its various grades, which may occur in the eye or its protective organs, and which will, so far as they are concerned in prophylaxis, be con-

sidered under special and trade hygiene, we shall have to speak about the effects upon the eye of the longer or shorter action of intense heat though this does not cause any direct burning. It gives rise to a more or less rapidly developing cataract. The requisite prophylactic measures will be given in the corresponding chapter on trade hygiene. This form of injury has been referred to here because it has been observed as the consequence of being struck by lightning, but from the nature of the case it follows that there is no prophylaxis against this cause. This injury may be characterized by a combination of the dazzling effects by the visible rays, the severe action of ultra violet rays and the effect of intense heat.

(*c*) *Chemical Injuries*

By chemical injuries we understand those injuries in which the pathological conditions of the eye have been caused by chemical reagents which act, partly by causing nutritive disturbance, partly by direct chemical decomposition (chemical combinations), or by direct destruction of the tissue. These effects are special, and will be dealt with under the prophylaxis of organic disease and prophylaxis in occupations.

(*d*) *Infective and Parasitic Causes*

These injuries are very various in their nature. Infective and parasitic causes acting from without are first of all limited to the eyelids, the conjunctiva and lachrymal organ, and the anterior part of the eyeball where direct lesion is possible, but may affect the whole eye, and sometimes secondarily the whole body. The various kinds of injury will be dealt with under special prophylaxis, because the prophylactic measures will differ according to the nature of the infection.

The general preventive measures to be observed are identical with those given for the prevention of one of the commonest infectious disorders of the eye, namely trachoma, and we refer the reader to that section of special prophylaxis.

2. Injuries from Within

The foregoing section has dealt with injuries and their prevention, when the action is independent of the bodily constitution and of the physiological use of the eyes. The following section will deal with those factors which are dependent upon the constitution and may give rise to pathological conditions in the eye.

The first to be considered is—

(*a*) *The General Mode of Life*

It must first be pointed out that by the "general mode of life" are meant all those more or less voluntary activities of the individual over and above the physiological activity of the organ of sight, and that it does not include the manner of life in relation to the direct use of the eyes.

In so far as these have reference to the time of life of the individual, they will be dealt with in those special chapters.

Here we have to consider the mode of life in relation to ventilation of the home, cleanliness in general, clothing, food and the use of stimulants and correct arrangements for alternations in work, recreation and sleep.

The greater or less pureness of the air around us is of the greatest importance for the organ of sight as well as for the whole body. To stay in an inefficiently ventilated room has a twofold injurious action upon the eye. On the one hand the eye will be injured because general metabolic changes are produced which indirectly give rise to nutritive changes in the eye. On the other hand the badly ventilated room has a direct injurious action upon the organ of sight, because the air which is laden with all possible kinds of constituents may cause irritation, especially in the mucous membranes of the eye; moreover, when the room is artificially lighted, the eye suffers quite apart from the mechanical irritation of the eye by the tiny particles of dust found in the air of a badly ventilated room. Further the irritation of the mucous membranes of the respiratory organs, set up by the impure air, will also

indirectly affect the eye. The special forms of possible injury will be dealt with under special prophylaxis, especially in the chapters on "conjunctival catarrh" and "disorders of the lachrymal organs."

Another important factor for the preservation of the eyes is a careful habit of cleanliness, not only of the head and face, but of the whole body. Indeed every oculist knows that a number of so-called scrofulous diseases of the eyes of children are cured without any other treatment than washing the children carefully.

This care in washing has also a further use which is of great prophylactic value: by bathing, or at least a daily wash of the whole body with cold water, the body is at the same time braced up against the changes of the weather, and colds with their sequelae affecting the eye are prevented.

In regard to clothing everything must be avoided which might cause circulatory disturbances. The constriction of the neck by wearing tight collars has an injurious effect upon the eye, because it hinders the return of the blood to the heart from the brain and eyes. Corsets and tight belts are indirectly injurious by setting up general disturbances of the health, especially through the digestive disturbances which they cause.

Prophylactic measures in this connexion may be summed up in this: that appropriate clothing according to the principles of general hygiene is best adapted to prevent indirect injury to the eye. One special part of the dress must be mentioned in greater detail, and that is the headdress, and in women the veil. The headdress should be so arranged that the head is not kept too warm; else a local hyperaemia of the head and face is produced. It should be provided with a brim to protect the eyes from the sun and from foreign bodies from above, and against rain and snow. On the other hand the brim should not be so low as to prevent a free view, or even force the wearer to walk with the head thrown back, and his visual line therefore directed somewhat downwards, as is so often the case nowadays in women who wear the modern straw hats.

A veil should never be worn except in cases where it is also advisable that men too should wear veils, as in travelling in mountains and in dusty regions. Unless the meshes of the veil are very wide, it holds a layer of impure air in front of the face, so that the wearer is breathing an atmosphere similar to that of a badly ventilated room. It is apt to produce a local hyperaemia of the covered parts of the face. Moreover it hinders the clearness of vision, because the wearer looks out upon the external world through a narrow lattice, spotted veils being particularly bad.

The diet is also of importance. Every deviation from a physiologically correct diet and every excess in the use of alcohol has an injurious effect upon the eye. But insufficient food and a diet consisting of food in wrong proportions has also an indirect injurious effect. It is a well known fact that trachoma and night blindness are very common in Russia at the time of the great fast of Lent, and scurvy may leave various eye affections as its sequelae. The special injuries caused by diet and stimulants will be dealt with in the chapter on special prophylaxis.

Nothing special can here be said about a proper division of time for work, recreation and sleep: that will be best for the eyes which is best for the general health. At most we can merely say that it would be obviously wrong for a person to use the recreation hours for reading, needlework and other things which strain the eyes, unless his usual work makes no great demands upon them. Naturally it is impossible to lay down any general rules; we can merely say: the greater the demands made upon the eyes of an individual by his daily work, the greater is the necessity that he should avoid any strain upon the eyes during his hours of recreation.

(*b*) *Physiological Conditions*

The prophylaxis of diseases of the eyes produced by physiological conditions has to deal with those injurious consequences which result from a neglect to observe certain precautions in the use of the eyes during the normal action

of certain organs. The functions here referred to are especially digestion, and in women menstruation, particularly at puberty and at the climacteric, and pregnancy.

In regard to digestion prophylaxis is concerned with the period following a meal: one should avoid doing any work directly after the principal meals which would strain the eyes. During the process of digestion there is an increased flow of blood to the vessels of the digestive organs, and a correspondingly diminished flow to the vessels of the head. Thus there is in the brain and eye a certain degree of anaemia, the blood in this organ is not sufficient for great activity, and symptoms of over tiredness soon set in, which are the more severe the less the general power of resistance possessed by the individual.

During the menstrual period and during pregnancy the power of resistance and the functional capacity of the organism of the woman are probably reduced for the same reasons; consequently a relatively small amount of work produces the symptoms which result from overstrain.

(*c*) *Consanguinity and Heredity*

Consanguinity in the parents and heredity are important in connexion with the aetiology of diseases of the eyes. These diseases are very definite, and details will be found under special prophylaxis. It may be said in general that consanguinity tends chiefly to cause retinitis pigmentosa, and that heredity is a great factor in the causation of functional anomalies, certain organic diseases, such as cataract and optic atrophy, and of malformations.

(*d*) *Dyscrasias, Infective and Non-infective General Diseases*

What has been said about consanguinity applies also to dyscrasias and to infective and non-infective diseases. The question is mainly one for special prophylaxis, because these are special diseases with special sequelae.

It is only in the case of some dyscrasias, as in scrofulosis, that prophylaxis can prevent disease, and in a few acute

infective diseases and the functional disturbances which may follow febrile disease. With the remainder of these diseases prophylaxis can only prevent the further consequences of disease which is already present.

The general prophylactic measures are identical with the prophylaxis of the particular infective or general disease.

(*e*) *Poisons*

The same is true for a large number of poisons which may have injurious effects upon the eyes. The main point is to prevent the poisoning from taking place. If poisoning has set in it is no longer possible to prevent disease of the eye. The various forms of poisoning will be found under special prophylaxis.

3. Functional Diseases

Prophylaxis has a great and important task in the prevention of functional disease, because most of these diseases arise from faulty use of the eyes and are therefore diseases which owe their origin to a factor that is dependent upon our will. As was stated in the introduction, they may be caused by—

(*a*) The way in which we work; or

(*b*) The kind and amount of work we do.

Prophylaxis is especially valuable in youth. It is now conceded as an indisputable fact that short sight appears in a very large majority of cases between the tenth and twentieth years of life, and that the way in which the eyes are used and the conditions under which they are used have an important influence upon the development of shortsightedness.

(*a*) *How we ought to Work*

First we have to consider the posture assumed when at work, and secondly the illumination. Faulty posture when at work, so that on the one hand the eyes are brought too close to the work, and on the other hand the head is held in a faulty position, so that one eye is brought much closer

to the work than the other and the eyes are compelled to work in a position which deviates greatly from the primary position, may be the cause of a number of diseases: muscular spasm and muscular weakness, squinting, spasm of accommodation, accommodative asthenopia, short sight, hyperaemia of the retina and of the optic nerve, and secondary disease of the conjunctiva and eyelids, according to the individual structure of the eye and individual predisposition. The consideration of the individual factors will be found under special prophylaxis. In the following those prophylactic measures will alone be given which are generally independent of the individual predisposition.

In this chapter, as was stated above, we shall consider chiefly the prophylaxis required in the young; first for the reason given above, that neglect of such prophylactic measures in youth is especially liable to be followed by ill effects, and secondly because an individual accustomed from youth to work with the body in a correct posture will continue the habit in later life.

In youth we have to consider the time spent at school for close work of the eyes while reading, writing and drawing; and in the case of girls needlework has to be added.

And we must therefore decide what prophylactic measures will tend to prevent those functional diseases which arise from working in a faulty position; how the scholar should sit when at work; how a school desk ought to be made so as to be hygienic and prophylactically correct. And what is said about the school desk applies also to other work and periods of life.

The following particulars about school desks are taken in the main from the work of Fick.

A good school desk must be so constructed that the scholar can, without fatigue, read and write in the upright posture for hours.

If one sits straight upon a chair the centre of gravity of the body falls within an area bounded posteriorly by a line between the ischial tuberosities, anteriorly by the edge of the chair, and to the right and left by the thigh bones.

This straight position cannot be maintained for long without some support even by a man who is fully developed and muscularly strong, because constant muscular contraction is needed to keep the balance, and the attention of the individual must therefore be directed to maintaining the upright position. Directly the attention is removed from this the upright position is unconsciously relinquished and some support for the upper part of the body is sought. The school desk must therefore be so constructed that, when in use, the body should maintain a suitable upright posture for all work, be this writing, reading, drawing or needle-work, and be capable of keeping upright without the help of the will or attention. This is accomplished by constructing the desk in such a way that every part of the body may remain in the desired position free from all muscular effort.

Many careful researches were made, and the inquirers are agreed upon all essential points. With classical brevity Esmarch of Kiel has condensed these points in a leaflet which he gives in his surgical clinic to parents whose children are growing up crooked. It bears the title, "How School Children ought to Sit." The instructions are—

"School children grow up crooked and short sighted from sitting in a crooked position on bad old fashioned school benches. They sit crooked when the bench is placed too far from the school desk, when it is too low relatively to the table and is without a proper back. The school bench should be such that the child must sit upright on it when reading and writing, and can sit in this position for a long time without getting tired. To effect this, (1) the seat must be at a distance from the floor or footboard equal to the length of the child's leg, as measured from the ham to the sole of the foot; (2) the seat must be as deep as the length of the thigh, measured from the ham to the back; (3) the rounded front edge of the seat must project about an inch beyond the inner edge of the table; (4) the seat must be high enough to enable the child to lay the forearm comfortably upon the table when writing, without having to raise the shoulders or lower the head and back; (5) the lower part

of the back must be properly supported when reading. These measurements alter as the child grows, and the seats should therefore be measured at least every six months and adapted to the changed conditions."

These sentences express all that is necessary to be said about a seat for children and for adults when at work.

It is beyond the scope of a work on prophylaxis to detail the various ways in which these requirements may be met; that belongs to hygiene, and in this connexion we refer the reader to Hermann Cohn's work on the Hygiene of the Eyes and to E. Fick's treatise on the Care of the Eyes.

In addition to a suitable desk other mechanical aids may be used to ensure a correct position of the body. An excellent aid is the "flap spectacle" invented by a teacher in Bâle named Müller. When the body is upright these have the position which the peak of a cap has above the eyes; but if the body is bent the flap comes down and makes it impossible to see; if the individual again sits up the flap returns to its original position. Various forms of support are also useful for this purpose. They will be mentioned in the section on the prophylaxis of myopia.

The answer to the question of the position of the body was relatively simple, but the answer to the second question, that of illumination, is complicated. In order that the eyes may not suffer injury the illumination must be sufficient but not too strong, and the method of the illumination has to be considered as well as the strength. The question is further complicated by the fact that two kinds of illumination—natural and artificial—have to be considered, and in connexion with artificial illumination there are various different sources of light. Let us first answer the question: What is sufficient illumination?

The illumination is sufficient when a normal eye, or an eye which is properly corrected, can read the finest printing fluently at a distance of 10 to 12 inches. This is apparently a very simple definition; but if we examine a number of persons we shall meet with great individual differences. Cohn found that in one of the persons he examined there

was normal acuteness of vision with one-tenth of the illumination required by another. We must therefore take some average. The minimum has now been definitely agreed to be that amount of light upon an area which would be supplied by eight (English) standard candles at a metre distance.

Various kinds of apparatus have been devised to determine the degree of illumination over an area. The two best known and the most practical are Weber's photometer and Cohn's light tester. Weber's photometer is the more accurate of the two and enables us to determine accurately the illumination of a given area in terms of normal candle power. The instrument is however rather expensive and not very simple to work, and Cohn's light tester is therefore more useful in practice. This does not estimate the illumination in candle power, but enables us to determine very quickly and simply whether a certain place is sufficiently illuminated for work. The apparatus consists of a small box, which is held before the eye, and is closed by three screens of tinted glass which can be raised; there is also a white slip of cardboard upon which are twelve vertical rows, each with thirty numbers in very small print, and this can be brought as near to the eye as is desired by being slid along a metal rod fixed to the little box. Eyes which are very myopic, or which cannot for some other reason be corrected to the normal, cannot be tested. If the normal or the corrected eye can read quickly and comfortably these rows of numbers at 16 inches when the three pieces of tinted glass are lowered, then the illumination is sufficient, because these three glasses absorb about ninety-nine per cent. of light, and the hundredth part of the light is still sufficient to enable the one who is being examined to read. If he can only read comfortably through two of the tinted glasses, which absorb ninety-five per cent. of the daylight, then the light is still sufficient for work; but if only with one glass, which absorbs eighty per cent., then the place is unfit for work. The amount of daylight may vary much in any place because of more or less dense clouds, and Cohn contends that when the conditions are thus unfavourable the place ought to be examined. This

examination under unfavourable conditions is suitable too when there are individual differences. This light tester is equally useful in the case of artificial light.

What measures must be adopted to ensure sufficient illumination, whether by daylight or artificial light?

The answer to this question does not belong to prophylaxis but to hygiene. Prophylaxis is restricted to determining the general principles. These general principles are as follows: every place used for work should be freely accessible to daylight and should be illuminated by direct daylight and not by reflected daylight. A place which is well illuminated but in which the light received has been reflected from buildings in front of it cannot be called fit to work in, because the slightest variation in the light will be felt much more intensely. Moreover the colour of the light will not be that of pure daylight, but will depend upon the colour of the building from which the light is reflected. Rooms are also unsuitable to work in when shaded by trees which stand near the windows.

The first requisite for a work place, from the prophylactic point of view, is then free access for open daylight. And it is of course obvious that all parts of the same room are not equally well adapted for working; nearest the windows is obviously the best. The further from the window the less well adapted is it for work.

The light should be so selected that the windows are placed to the left of the worker, because this prevents the work from being shaded by the hand and protects the eye from being injured by the direct entrance of light into it. If in addition there is light from behind, so much the better. These regulations have to be observed in providing sufficient light. We have now to consider how too much light may be avoided. Any place will have too much light upon which the sun falls directly. Even if the worker's face is not turned towards the sun, yet the light reflected from the book, writing paper or other work will be so intense that symptoms of dazzling will appear. The work place should be so chosen that diffused daylight can enter without hindrance but no direct sunlight. Rooms

which are exposed to direct sunlight during some part of the day must be suitably protected against the sunlight, but the screen should only keep out the excess of light, that is it should make the light equal to that of diffuse daylight. In regard to the construction of such screens we must again refer the reader to books on the hygiene of the eye.

These principles for the regulation of daylight apply also to artificial light. Here the main principle is that that artificial light is best which most closely resembles diffuse daylight in power and colour. With artificial light there is however a further question to be considered, namely temperature and the products of combustion. That artificial source of light is the best which least increases the temperature and produces fewest products of combustion. It is impossible here to go thoroughly into the question of the various kinds of artificial light, because it would take us too far into the domain of the hygiene of the eye; we shall merely say that most of the requirements are best fulfilled by an electric incandescent light with a dull shade. The next best is gas light. The electric arc light has the disadvantage of shining too unsteadily and of containing too few red rays. Next come the Argand burner and the paraffin lamp. Candle light requires that several candles should be used, otherwise illumination equal to ten meter candle power is not obtained; the more so because the power of illumination of a source of light diminishes not in arithmetical but in geometrical progression with the distance of the object.

Artificial light should be so arranged that, as in the case of daylight, it comes from the left and that the light does not fall directly into the eye. The latter may be prevented by suitable shades. These should not be transparent and should have an inner reflecting surface. Transparent lamp shades, especially when patterned, are always bad whatever be their colour, because the side light falls upon the periphery of the retina and irritates also sometimes by the different degrees of illumination thrown upon the work. They may indeed directly cause morbid symp-

toms, such as supraorbital neuralgia and partial temporary scotoma.

(*b*) *The Amount and Kind of Work*

As to the amount of work, it is of the first importance for the eye as for the body that rest and work should alternate. Now perfect rest of the eye is impossible so long as we are in the waking state, because while the eyes are open they will unconsciously receive impressions. Alternation between rest and work must be understood to mean that conditions in which retinal perception is accompanied by tension of accommodation and of the converging muscles should alternate with conditions in which there is retinal perception only, with sufficient illumination, but without accommodation or convergent activity; in other words, near work should alternate with distant work.

Near work is the chief cause of short sight and of accommodative asthenopic troubles; this will be more fully dealt with under prophylaxis for these two disorders.

As will be evident from those chapters, the disposition to these diseases is extraordinarily different: while one individual can do near work almost uninterruptedly so long as he is awake without any ill effect, another individual will be injured by a minimum of near work; there are therefore no general rules valid for all as to alternation between near and far work. To individualize is one of the chief requirements for prophylaxis. In general however we may say that it is best, especially with children, not to let near work last longer than one hour at a time without a break. Further details will be given under the prophylaxis of myopia.

As to the kind of work it is scarcely possible in the space at our disposal to consider all the factors concerned in the immense number of differences in the requirements of various callings. But we shall attempt to state general prophylactic rules.

In regard to the size of the object for which the eyes are used, we must look upon it as injurious to the eyes if, notwithstanding a sufficiency of illumination, the object is so

small that it must be brought closer than 12 inches to the eye, in order that the visual angle may be five minutes. Experience has proved that this is the smallest visual angle that enables the eye to distinguish objects clearly. If therefore the object is so small that the visual angle is not five minutes at 12 inches, the object must be brought closer in order to be clearly seen, and excessive accommodation results. This excessive tension of accommodation is then apt to produce a number of morbid conditions both functional and organic.

Further, if the work is not to injure the eyes, the object to be seen by the eye must stand out clearly from the background, that is there must be as great a difference as possible between the illumination of the object and of the background. Therefore white work upon a black background or black work upon a white ground is least apt to injure the eyes. The less the difference in illumination or colour, the greater is the demand made upon the perceptive faculty and upon the power of accommodation of the eye. Moreover the objects should give off as little light as possible, i.e. should radiate as little of their own light as possible. Work done with objects which strongly reflect or radiate light predisposes to disease.

B. SPECIAL PROPHYLAXIS

1. The Prevention of Special Diseases

In this section we shall first consider all the organic and functional diseases of the eye, in so far as prophylaxis of these is possible.

Next we shall consider those general diseases which may give rise to eye disease, in order to find out in which of these general diseases we ought to think of the possibility of the development of disease of the eye, and which forms of disease are liable to appear as the result of a given general disease. We shall in some cases have to determine whether active prophylactic treatment can altogether prevent the outbreak of disease of the eye, or whether prophylactic measures must be restricted to treatment of the eye

affection directly the first symptoms have appeared, and thus prevent more serious consequences.

In this chapter also we shall specially consider the circumstance that the presence of eye trouble or eye symptoms may sometimes show the need which exists for general prophylactic measures.

(*a*) *Prophylaxis of Organic Disease of the Eyes*

Disease of the Orbital Cavity.—Among diseases of the orbital cavity which we have to consider in regard to their prophylaxis are wounds, inflammatory affections of the orbital cellular tissue and of Tenon's capsule, tuberculous and syphilitic ostitis and periostitis, and affections of the orbit which have extended to it from neighbouring cavities; and further the diseases which may cause exophthalmos, namely exophthalmic goitre, aneurism and orbital haemorrhage.

In regard to wounds it is very important that every wound near the orbital margin, especially deep wounds of the eyelid, should be very carefully and antiseptically treated, because, owing to the loose texture of the subcutaneous tissues in these places, a rapid spread of a possible infection is to be feared. In this respect wounds in the region of the lachrymal gland and lachrymal sac are specially dangerous.

The results to be feared would be the same as in inflammatory or infective disease of the orbital cellular tissue, for example in erysipelas or sinus-thrombosis; they are great protrusion of the eyeball and inability to close the eyelids; and secondarily there would be the danger of the inflammation extending to the optic nerve, with permanent injury to the sight, and also of disease of the cornea as it can no longer be protected by the closure of the eyelids. Prophylactic treatment is then greatly needed; and we must try to prevent this disease of the cornea because the cornea may be rapidly destroyed by ulceration when there is any loss of epithelium however small. If then from any cause exophthalmos is present, and is sufficient to prevent the lids from being properly closed, and if there is also much

chemosis, then, in addition to the other treatment required for the original cause, the cornea will have to be continuously protected until the protrusion and chemosis have so far disappeared that it is again possible to close the eyelids. In comparatively slight cases, when the eyelids can be closed up to one-eighth or one-sixth of an inch, the cornea may be protected by smearing freely a two per cent. boracic acid ointment between the lids and bandaging with a warm moist bandage, or covering with a piece of lint thickly coated with boracic ointment. In severe cases, especially with marked chemosis, it is best on the one hand to reduce the tension of the lids by dividing the outer commissure, and thus prevent constriction of the chemosed conjunctiva in the palpebral fissure; and on the other hand to close the palpebral fissure by sutures through the upper and lower lids, which draw them forcibly over the eyeball. In tying the sutures one must be very careful to avoid any entropium.

These sutures must be loosened every twenty-four hours to prevent any accumulation of secretion and to see the condition of the cornea.

If when the wound was inflicted a foreign body has entered the orbit, which may set up sepsis, such as a splinter of wood, it should be removed as quickly as possible. Other foreign bodies on the other hand, especially hot pieces of metal or shot, may under some circumstances for prophylactic reasons be left quietly where they are, at least for the time being, more particularly when the Röntgen rays show that they will cause no injurious effect by their position. The general rules of surgery are here applicable.

For ostitis and periostitis it is sometimes necessary for prophylactic purposes to resort to operative interference earlier than the general principles of the treatment of these diseases would suggest. If these are situated near the orbital margin and have led to the formation of a sinus, there appears in most cases a retraction of the skin of the lid near the sinus, which secondarily causes ectropium, by drawing the edge of the eyelid up or down. This may be so great that it becomes impossible to close

the eyelids properly at that spot. The dangers to the eyeball are then similar to those in exophthalmos, and we must then at least see that the lids are brought together. The skin which is contracted should be freed and drawn into position, so that it is possible to stitch the diseased lid to the sound one; and even in those cases where it is not possible to remove the diseased bone and make a radical cure, we can succeed in making the sinus take up a less dangerous position, especially if we make a way for the discharge by providing an opening in the skin, which is kept open by a drainage tube. If this is not sufficient pedunculated pieces of skin must be transplanted to allow of drainage and to correct the position of the lids. The prophylaxis for orbital disease which results from affections of the neighbouring cavities and for tumours is similar to that for inflammatory affections and for exophthalmos; this is true also for the exophthalmos, which is the consequence of general disease.

If the ophthalmoscopic examination shows that optic neuritis is beginning to develop or has developed as the result of one of these orbital diseases, then expectant treatment under any circumstances whatever is to be condemned. In these cases the only possible way of preventing serious mischief is by energetic interference according to the nature of the case, operative treatment being necessary in most cases. In these cases we must not hesitate to remove even benign tumours, although in other cases expectant treatment is indicated for benign tumours.

Diseases of the eyelids and conjunctiva. The prophylaxis of the diseases of the eyelids cannot be separated from that of the diseases of the conjunctiva, because all factors which injuriously affect one of these parts will generally at the same time affect the other.

The prophylaxis against dangers which threaten from general diseases of the skin must be according to general dermatological principles, and further particulars about this will be found in the section on the prophylaxis of skin diseases. The same is true for those diseases of the eyelids,

which are identical with diseases on other parts of the skin, such as acne, furuncle or abscess. The prophylaxis of diseases of the eyelids and conjunctiva which may be the result of general disease will be dealt with under the prophylaxis of general diseases which react upon the eyes. In this connexion the chapters on the acute febrile exanthemata, on tuberculosis, syphilis and leprosy should be specially read, and those on diseases of the nose and throat; and in connexion with trachoma of the conjunctiva the reader should turn to the chapter on diseases of inanition and the chapter on diseases connected with occupations (nystagmus of miners). Here we shall consider only direct dangers.

These are principally wounds, the action of foreign bodies, smoke, dust, soot, dazzling light, strong wine, rain and the action of parasites. Foreign bodies, such as dust or soot, tend to cause hyperaemia of the edges of the eyelids and of the conjunctiva and catarrh, and can best be prevented by wearing plain spectacles which are large and mussel-shell shaped; glasses made of so-called mica can also be recommended.

These glasses are obviously only worn for prophylactic purposes when one knows beforehand that one will be exposed to such dangers. It is very desirable that such glasses should be worn by any one obliged to sit in a quickly moving carriage, particularly when going against the wind. That the laity have instinctively discovered this is shown by the protective spectacles which are worn by the drivers of motor-cars and which have recently been much used by cyclists.

If one must be exposed to much dust and is unable to wear protective glasses, as riding masters in covered riding schools, or soldiers marching along dusty roads, it is useful to smear the whole region around the eye and eyelids with a thin layer of fat; equal parts of vaseline and lanoline form the best application. Most of the dust will then adhere round the eye and perspiration will also be prevented from running into the eyes. Moreover one should always avoid wiping round the eyes with the bare finger. Infec-

tive material may thereby be carried into the eye, but there is also the danger that grains of sand may be directly rubbed into the eye. The habit of opening the eyes when diving or when dipping the face into the water of the wash-hand basin when washing produces conjunctival hyperaemia and conjunctival catarrh. The conjunctiva is more susceptible to contact with ordinary water than is generally believed; and in addition to this it may become infected by the water of a swimming bath. As a curiosity I may mention that I once observed an obstinate catarrhal conjunctivitis which was not cured till the patient ceased to dye her hair. Probably this was due to some chemical cause. The prophylaxis against wounds will be found in the chapter on trade prophylaxis, for we can only guard against injuries which can be foreseen. There too prophylactic treatment will be found for injury by lime and burns. Prophylaxis against the effect of dazzling light, especially by snow, and against the effect of electric light has already been given under General Prophylaxis.

In regard to prophylaxis of wounds of the skin of the eyelids, the main points are strict antiseptic treatment to prevent infection and its consequences, and a very careful bringing together of the edges of the wound and the avoidance of removing even the smallest piece of skin or of conjunctiva; as neglect of this precaution may lead to the most unpleasant deformities which have then sometimes to be made good by extensive and tedious plastic operations. In connexion with antiseptics it should be remembered that the eye is extremely sensitive to concentrated solutions of antiseptics. Corrosive sublimate should not be used in a stronger solution than 1 in 5,000, and carbolic acid than 1 in 40.

Chronic irritative conditions of the conjunctiva with secondary eczema of the edge of the eyelids may also be caused by functional disturbances, especially by excessive efforts to accommodate, as in hypermetropia and the hyperaemia of the eye and its surroundings which result from it. Details will be found under the prophylaxis of functional disturbances.

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In such affections, especially when the history is obscure, we should always think of the possibility of a refractive error and make an examination for prophylactic purposes.

The most valuable task for prophylaxis is afforded by infective diseases of the conjunctiva, as infective conjunctivitis, conjunctivitis neonatorum, gonorrhoeal conjunctivitis, trachoma, and to a lesser extent diphtheritic conjunctivitis.

The prevention of these diseases is the more important because they may be the cause of more or less severe diseases of the cornea. Simple catarrh, if it lead to any corneal affection at all, may possibly cause a simple corneal ulcer which is fairly easy to heal, but in severer cases it may cause serpiginous ulcer of the cornea; but trachoma often causes more serious injury by the formation of pannus, and the other diseases named often lead to total blindness through perforating ulcer of the cornea.

In all cases the strictest cleanliness is needed. It is not by mere chance that infective diseases of the conjunctiva are very much less common among adults of the educated classes who are accustomed to cleanliness than among adults of the artisan class and among children.

If any member of a family is suffering from some purulent catarrh of the conjunctiva, strict precautions must be taken that the patient's towel, handkerchief and wash-hand basin are not used by any one else. Further it is advisable that the healthy members of the family should frequently wash their eyes with a mild astringent, such as a quarter per cent. solution of sulphate of zinc, or at least they should wash the eyes several times a day with cold or lukewarm water or with a weak solution of boracic acid or of corrosive sublimate. The same holds good in still greater measure when the catarrh of the conjunctiva assumes from the very first an endemic or epidemic character, attacking several members of a family or several children at a school or other institution where a large number of individuals live in more or less close intercourse, and are attacked by the disease simultaneously or quickly one after the other.

As a prophylactic, the separation of the healthy from the

diseased is very important. In epidemics at school the patients should always be excluded from the classes and the strictest cleanliness must be insisted upon in the school buildings. The catarrh may be caused by different exciting causes: the Koch-Wecks bacillus, the Morax-Axenfeldt diplobacillus, and Fraenkel's pneumococcus have been proved to have caused such epidemics.

Conjunctivitis neonatorum is probably the first danger which threatens the eye when the child is born; for this danger begins even while the child is passing through the genital passages, because the conjunctiva may there become infected by morbid vaginal secretion. The gonococcus of Neisser is the commonest cause of conjunctivitis neonatorum. But recent observations have shown that it may arise in the absence of the gonococcus, from infection by bacterium coli more especially.

The importance of prophylaxis against this disease is proved by the fact that in the institutions for the blind in Germany and France in 1886, it was found that two-thirds of the pupils had been blinded by conjunctivitis neonatorum. One would imagine, seeing the simplicity of the infective process, that differences of opinion would scarcely be possible; and yet two views about the subject stand in direct contrast one to the other. Cramer's explanation of the process of infection is that the os uteri pulls upon the eyelid even so as to cause ectropium, and that the infective material comes then into direct contact with the conjunctiva of the eyelids. But Wecker takes just the contrary view; he maintains that the eyelids are kept tightly closed during the passage of the child, that the infectious matter can therefore only come into contact with the outside of the lids, and does not enter the eye till some time after birth, and is caused partly by movement of the eyelids and partly by improper handling by the attendant. And corresponding with the two views we find the proposed prophylactic measures diametrically opposed.

Those who hold Wecker's opinion declare that all direct disinfection of the conjunctiva is perfectly useless. They recommend on the other hand—

1. That immediately after birth the lids and region of the eye should be thoroughly cleansed with a piece of wool dipped in a one per cent. solution of the cyanide of mercury.

2. That the entrance of any of the bath water into the eye must be strictly avoided.

3. That after the first bath the eyelids should again be carefully cleansed in the way above described.

The followers of Cramer's theory, which is the older, and generally accepted, recommend that the child shall first be washed, including the face and eyes, and that a disinfectant should then be brought into direct contact with the conjunctiva; and they maintain that aseptic prophylaxis alone is useless.

But there is again difference of opinion about the antiseptic to be used. Some recommend Crédé's method, that is nitrate of silver, others recommend protargol. Some maintain that nitrate of silver should not be used; because it increases greatly the number of germs in the conjunctiva and acts as an irritant. Also that there is no danger to the cornea from the gonococci, but that the danger comes from the pneumococci and staphylococci which subsequently appear. The compulsory use of Crédé's method is therefore they say to be rejected and protargol to be used instead. The large majority of observers however say that the difference before and after Crédé's time is so enormous that there is no reason for discontinuing it, and that the use of nitrate of silver as a prophylactic is never injurious.

The experience of the great majority of ophthalmic surgeons is that it is a matter of indifference whether one uses protargol or nitrate of silver. In favour of nitrate of silver is the fact, proved with absolute certainty, that with the introduction of Crédé's method conjunctivitis, which was before so common in lying-in institutions, has become much more rare, and the method has never caused any ill effect when properly carried out. In favour of protargol is the fact that its antiseptic value is equal to that of nitrate of silver, and that it has the additional advantages of not injuring even in concentrated solutions and of penetrating more deeply into the tissues.

The preventive treatment of conjunctivitis neonatorum is therefore as follows. Directly after division of the cord the child is put into a bath, and the eyes are at the same time washed with a clean piece of rag or wool, not with the bath water but with some other clean water, or still better with a disinfectant, for example the solution of the cyanide of mercury mentioned above. Then the child is placed upon a table, and before being dressed a drop of a two per cent. solution of nitrate of silver or a twenty per cent. protargol solution is dropped into each eye with a glass rod while the lids are drawn apart by the fingers. This should not be repeated even if there should be some slight redness and mucous discharge during the next twenty-four hours.

If an infant is brought to the physician and one eye only is attacked, the utmost must be done to prevent the other eye from becoming affected. The child's nurse must be told not to touch the region round the healthy eye, except directly after having washed her hands, and then only with a clean piece of wool and clean water or disinfecting lotion. If she wishes to clean both eyes the healthy eye must be cleaned first. The child should lie on the side of the diseased eye to prevent the purulent discharge from it flowing into the healthy eye. In addition to this, the physician should drop into the sound eye a drop of Crédé's solution or a drop of the protargol solution every day.

The attendants upon the child should be told about the great risk of infection even for adults.

Gonorrhoeal conjunctivitis may be prevented by the observance of caution and cleanliness in patients with gonorrhoea. The physician who is treating a case of gonorrhoea should always point out to the patient the risk of getting conjunctivitis, and should caution him to wash his hands every time after having touched the diseased part.

Special care must be taken to protect the sound eye when, as is usually the case, the patient comes with one eye only affected. The physician should first treat the healthy eye by washing the eyelids and putting in a drop of a one per cent. solution of nitrate of silver, or of a ten per cent.

solution of protargol. The sound eye may be protected by an occlusive bandage. The bandage may be made as a "window bandage," allowing the eye both to see and to be seen. Burchardt has the window bandage made as follows: a piece of mica is fastened between two perforated pieces of wool by means of collodion. The outside of the wool may be made waterproof by collodion, and the wool can be fixed to the skin of the nose and cheek by collodion. With the aid of such a bandage it is nearly always possible to prevent infection of the sound eye. But I must confess that I do not regard this last precaution as absolutely necessary. During the last few years I have treated infection of one eye without any further precaution except that I impressed upon the patient the danger of allowing the discharge to get into the other eye, and I used protargol drops as a prophylactic and no infection of the healthy eye occurred.

Although the exciting cause of trachoma is not definitely known, yet there is no doubt that trachoma is a disease which is conveyed chiefly from one person to another. The endeavour of prophylaxis must therefore be to prevent the conveyance of infection.

In regard to general prophylactic measures it should be remembered that infection is the most easy the more crowded together people are and the less the attention paid to cleanliness. Therefore in districts infected with trachoma the sanitary arrangements and lodgings should be supervised.

Unfortunately very little can be done by police regulations if those threatened with the disease do not understand the object and reason for the regulations. As in many other cases so here the best prophylaxis would be to improve general education in respect to hygiene. Suitable instruction, which in districts infected with trachoma should be repeated every year, combined with the enforcement of proper rules at least during the hours that the children are under the care of their teachers, would be the best way of spreading the knowledge of the necessary prophylactic measures among the population.

As an example of the way in which the authorities

might act, we append the report of the Medical Commission of the Grand Duchy of Mecklenburg on Trachoma and its Prevention. They will be given verbatim, omitting subsidiary points, because they contain all that is known about the necessary prophylaxis.

1. Trachoma is an infectious disease of the conjunctiva (inner surface of the eyelids) but may extend to the eyeball, and in addition to pain and other troubles may produce serious impairment of vision. It generally attacks both eyes and spares no age. It is a very chronic disease, generally lasting many months and often years, and is very apt to relapse. Capacity for work may be very greatly reduced by it or even altogether destroyed.

2. All the secretions of the eye (tears, pus, mucus) are infectious. These secretions may infect others through touching the face, hands, linen, or utensils used by the patient. Very often the infection is conveyed by the common use of handkerchiefs, towels and washing apparatus. The infection cannot be conveyed by the air. Uncleanliness, insanitary dwellings, deficient ventilation favour infection.

3. In order to prevent infection the following points must be observed—

(*a*) Every one should make a rule never to use pocket-handkerchiefs, towels, washing apparatus, bed linen, or tools used by others unless he knows they are healthy. Those who have any affection of the eyes must be most strict about this. Every one suffering from eye disease should very carefully prevent any of the discharge being conveyed to others; he should have and use his own things (linen, water, utensils); he should wash his hands frequently with soap and water.

(*b*) When a large number of workmen have to occupy a common dwelling, it is very advisable that their eyes should be previously medically examined. Any who are already affected should have their own special washing apparatus, towels and bed linen, and if possible be isolated, supposing that the physician permits the work to be continued.

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(*c*) When a patient is found to be suffering from trachoma with a watery or purulent discharge, daily medical treatment becomes necessary in order to cure it as quickly as possible; and the patient should be taken into a hospital if other arrangements for this cannot be made.

Such treatment of the disease will most quickly remove danger of infection. When the discharge ceases, the patients are generally fit to return to work. Patients suffering from trachoma without any discharge from the eyes need not be excluded from working with others, provided that they use their own towels and utensils, but they require medical treatment. If school children become affected they should be kept away from school, and a medical inspection of the school should be made.

With regard to special directions for prophylaxis where many people live crowded together in a small space, as in barracks, schools, prisons, and orphanages, the following are the chief rules—

1. Every one entering an institution or returning to it after an absence should be medically examined. He should not be admitted if suffering from trachoma. When admission cannot be refused, for example in an orphanage, the new inmate with trachoma should be isolated and be medically treated in the infirmary of the institution.

2. Every inmate of an institution should have his own washing apparatus, bed, handkerchief and clothes. The exchange of such things or the common use of them should be punished.

3. Regular examinations of the eyes should be made by competent physicians every month or every week according to the prevalence and severity of the trachoma in the institution.

4. Permission to leave the institution should only be given to healthy inmates and convalescents.

There are a few additional rules for armies. Special mention must be made of the stringency in the Russian army about the guardrooms and prisons, because experience showed that infection was often conveyed by towels

and other washing apparatus which had been used by different bodies of troops in succession.

As to schools—in every district which is but slightly infected and in districts where trachoma appears only spontaneously, every child with trachoma should be kept away from school till it is convalescent. In infected districts it is best to arrange special schools for instructing children who have trachoma.

If trachoma breaks out in an institution which was previously free from the affection, it should if in a district free from trachoma be placed in quarantine from the outside world and, as above stated, the healthy should be completely isolated from the diseased.

Prophylaxis against diphtheritic conjunctivitis proceeds along two lines: (*a*) prevention of infection of the conjunctiva in patients suffering from diphtheria and (*b*) prevention of infection of the attendants upon diphtheritic patients. For the former care must be taken that handkerchiefs which have come into contact with the mouth and nose should not be used to wipe the eyes. Very special care must be taken in this respect with patients who already have some conjunctival catarrh, because the need to wipe the eyes from time to time, and to use the handkerchief which is so close at hand, is specially great. In very small children the hands should be frequently washed or even bound down, so that the secretion may not be carried from the mouth and nose to the eyes. Washing the eyes with a solution of corrosive sublimate is also a useful prophylaxis.

If it is feared that the eyes of an otherwise healthy person have become infected, for example by the coughing of the diphtheritic patient and in the examination or treatment of the patient, it is best to wash out the eyes carefully with a solution of corrosive sublimate, and to drop in a twenty per cent. solution of protagol.

Among the diseases of the lids and conjunctiva, prophylaxis is possible for the eczematous affections which chiefly affect the young. Children of so-called scrofulous diathesis are specially predisposed to this affection, whether the diathesis

is a tuberculous or syphilitic one, or is the result of neglected affections of the mucous membranes of the respiratory passages, or of neglect of hygiene in food and in the house. Prophylaxis will have to remove the predisposing disease and also to regulate the mode of life. The dwelling rooms should be lofty, well ventilated and dry, on the sunny side of the house if possible; baths should be given, and the child should have regular and hygienic food and should be much in the open air, if possible in the country. These precautions may do marvels in those children who before being put under the prophylactic conditions sketched above had suffered for years from constantly recurring eczematous disease. Often these new conditions of life are enough without any other treatment to cure the disease. These eczematous affections should be thus prophylactically treated because they frequently pass over into diseases of the cornea which tend to cause permanent injury. In other cases however the corneal affection is primary, and the overflowing of the secretion produces the eczema of the lids. To prevent this eyelids which show any tendency to eczema should be sprinkled with starch powder, or smeared with a thin layer of two per cent. boric acid ointment.

For the different forms of pemphigus of the conjunctiva there is no prophylaxis apart from curative treatment. We have still to mention the prophylaxis of deformities of the eyelids and deformities of the conjunctiva. Here the question is no longer the prevention of the disease, but of the consequences of the disease. The treatment for inability to close the eyelids for any reason whatever was given when speaking of exophthalmos. Other measures belong to the chapter on curative treatment.

For all other distortions there is only one radical prophylaxis, namely removal of the deformity. When there is a tendency to entropium, especially spasmodic entropium, the patient should be told to resist this tendency by frequently drawing out the edge of the lower lid by stretching the skin; and in a tendency to ectropium, especially ectropium senile, the patients should be told that in wiping the eye they should begin at the outer

angle of the palpebral fissure and thence pass inwards to the inner angle, and at the same time push the lower lip upwards.

Here we must also utter a caution against methods which are sometimes followed by irreparable harm. A few leading principles can alone be given. If incisions have to be made in the eyelid or conjunctiva, they should never be made perpendicular to the edge of the eyelid but always parallel with it; otherwise disfiguring scars and even coloboma may arise. Further we must take care not to apply iced compresses for too long a time, because these have caused gangrene of the lid; and strong caustics should not be used unless it is possible to neutralize them quickly. Astringents and disinfectants must be used in as weak solution as possible, particularly when the case cannot be constantly watched by the physician.

One should also bear in mind a possible idiosyncrasy against some one drug, such as corrosive sublimate.

Parasitic diseases will be found in the section of the prophylaxis of eye disease in general diseases.

Diseases of the lachrymal apparatus are almost exclusively the result of diseases of the nasal mucous membrane; more rarely an affection of the conjunctiva is the cause. Careful treatment of the primary disease must be the main rule for prophylaxis. Concerning the prophylaxis of the consequences of disease of the lachrymal organs, measures must first of all be directed against the accumulation of secretion in the lachrymal sac, because if not treated energetically it may result in inflammation of the tissues around the lachrymal sac, great thinning of the walls of the sac and the development of a lachrymal fistula. There are other reasons too which make careful treatment of diseases of the lachrymal organs of great importance; since experience shows that in disease of the lachrymal sac and duct, the slightest lesion of the epithelium may lead to serious disease of the cornea, more especially to that extremely dangerous serpiginous ulcer of the cornea. Orbital cellulitis may also result from neglect of disease of the lachrymal sac and duct, and deformity of

the eyelids, particularly ectropium of the inner half of the lid may also follow a neglected dacryocystitis.

In regard to the aetiological prophylaxis of injuries to and diseases of the cornea part has already been given in the sections on diseases of the orbit, eyelids, conjunctiva and lachrymal duct, and the rest will be found under the prophylaxis of general diseases and prophylaxis in trades and accidents.

Here we shall therefore merely consider the prevention of the consequences of disease of the cornea.

In any disease of the cornea it must always be borne in mind that the uveal tract may become infected by extension of the disease. The iris being next the diseased cornea will be the first part to show signs of inflammation. Consequently in all diseases of the cornea care must be taken to see whether the aqueous humour remains clear, and whether the reaction of the pupil is normal. When there is the slightest suspicion of hypopyon or of irritation of the iris, mydriatics should be dropped into the eye as a precaution. But we must always remember that in old people, and especially in those who have arteriosclerosis, the use of mydriatics, particularly of atropine, has sometimes developed glaucoma. If then there is the slightest increase of ocular tension the mydriatic must be discontinued and pilocarpine or eserine be dropped in, even at the risk of causing a synechia. In such a case, of the two evils, namely glaucoma or posterior synechia, the latter is the less, because it may afterwards be removed by an iridectomy when the disease of the cornea has been cured. There is the less objection to this course in threatening glaucoma, because in extensive corneal ulceration, with which we are here mainly concerned, an iridectomy is generally required in most cases for the sake of vision.

If spontaneous perforation threatens in a case of corneal ulcer the anterior chamber should be punctured, sometimes repeatedly, in order if possible to prevent perforation by the ulcer. Moreover if the place at which perforation threatens lies near the periphery, eserine should be dropped into the eye as a prophylactic, but if it lies centrally atropine should

be used in order to get the iris as far away as possible from the place where perforation threatens. When spontaneous perforation occurs it is generally no longer possible to prevent prolapse and adhesion of the iris. These results should always be prevented when possible, because an adherent prolapsed iris tends to raise the pressure of the affected eye and to produce staphyloma.

It should not be forgotten that after perforation of the cornea, even though the lens capsule be uninjured, deposits are apt to form on that part of the lens capsule which is adjacent to the perforation, and when permanent these tend to form an anterior polar cataract.

For similar reasons when there is a perforating wound of the cornea the prolapsed iris should be carefully replaced, or where this is impossible removed. The prolapse should be tightly stretched when snipped off so that the edges of the wound in the iris may subsequently retract from the corneal wound.

The prevention of eczematous affections of the cornea in children is that which has already been given under the prophylaxis of eczematous inflammations of the conjunctiva. The prophylaxis of corneal affections which are dependent upon general diseases will be found in the section on general diseases. These general diseases are the acute infective diseases, syphilis, tuberculosis, leprosy, diseases of the respiratory organs, influenza, cholera infantum, typhus, gout and botulism.

Conical cornea occupies a position midway between organic and functional diseases, both with regard to its aetiology and its consequences. Some regard conical cornea as an organic disease not influenced by function, while others incline to the view that the activity of the eye, particularly in near work, tends to favour its development. If we accept the former view prophylactic interference is excluded. On the other hand if we accept the second view it is conceivable that prophylactic measures to remove the optical defect may be useful.

This removal of the optical defect is best effected by Lohnstein's hydrodiascope, a contrivance by which the eye

dips into a chamber filled with normal saline solution, which rests against the orbital edge like a pair of spectacles. The chamber is closed in front by a strong convex lens.

In all inflammatory diseases of the conjunctiva and cornea the photophobia should, for prophylactic reasons, be quickly and energetically treated, because a long continued spasmodic closure of the eyelids may cause serious functional disturbances. The development of permanent convergent strabismus, as well as serious disturbances of the power of vision which may pass into amaurosis, have been observed to result from it.

The repeated dipping of the whole face into cold water is the best treatment; the eyes should also be protected from glaring light by letting the daylight which enters the room of the patient be softened by a light grey blind. But dark protective glasses and very dark rooms should be altogether rejected for such cases.

The prophylaxis for inflammatory disease of the sclerotic will be found in the chapters on syphilis, tuberculosis, leprosy and gout, because idiopathic disease of the sclerotic is unknown.

The prophylaxis of staphyloma, in so far as it is the result of scleritis, belongs partly to uveal disease and partly to functional disease, and will be found in those sections.

Wounds of the sclerotic, if perforating, should be united as quickly as possible by sutures and be covered in by stitching the conjunctiva over the wound. If it is feared that infection has occurred, or if there be early signs of it, it is best to touch the edges of the wound and the adjoining vitreous body with the galvanocautery. This procedure is needed for prophylaxis against infection of the vitreous body which is known to become infected so readily. This is the only case in which prophylaxis is possible in disease of the vitreous body, because all other diseases of the vitreous body are secondary, and chiefly the consequence of choroid disease. As an aid to the antiseptic treatment of perforating wounds of the cornea and sclerotic the use of Crédé's ointment has recently been recommended.

There is no reliable prophylaxis of the diseases of the lens. That for anterior polar cataract following perforation of the cornea has been given above. The forms of cataract met with in children are most of them congenital, or have been acquired so young—for example cataract occurring with rickets—that we have no opportunity for prophylactic measures.

That nasal disease, particularly disease of a particular spot on the middle turbinate bone, has quite recently been given as a cause of cataract is merely mentioned here as a curiosity.

The hypothesis, accepted by a few only, that cataract may be caused by excessive strain upon accommodation, and that most cases of senile cataract can be referred to this cause, suggests the prophylaxis to be adopted, and is referred to under functional disturbances. To arrest the progress of senile cataract some recommend treatment with the galvanic current, others recommend that an ointment of iodine and potassium iodide should be rubbed into the temples.

In regard to cataract which is the consequence of some general disease, reference should be made to the chapters on diabetes, atheroma, senile marasmus, obesity and chronic nephritis.

The only forms for which prophylaxis is available—and here it is only a prophylaxis against the consequences—is in traumatic cataract and dislocation of the lens. In traumatic cataract the process of swelling and of absorption should be carefully watched, because on the one hand mechanical irritation of the iris may produce inflammation of the iris; and on the other hand great swelling may lead to increase of tension. The necessary procedure belongs to treatment and will not therefore be given here; we may merely mention that early and complete extraction of the lens is the best prophylaxis.

Those cases of dislocation of the lens in which extraction is delayed for a time for some reason or other, should be very carefully watched. The dangers which may result from a change of position of the lens are of two kinds:

there is the danger of inflammatory irritation as the result of permanent mechanical interference with the ciliary body, and there is the danger of increase of tension. The former danger will only appear when the lens lies permanently or temporarily upon the ciliary body; the second danger threatens every form of lens displacement.

To prevent the danger of inflammatory irritation the patient should be placed for a long time in such a position that the lens, according to the law of gravity, will be furthest removed from the ciliary body. If the appropriate position is maintained long enough by the patient, it is sometimes successful in fixing the lens in a less dangerous position. If nevertheless irritation sets in immediate operative removal of the lens can alone check the cyclitis; if the right moment is neglected enucleation may later be necessary.

To prevent increase of ocular tension pilocarpine and eserine should be used directly there is any sign of increased tension, and sometimes puncture, or if this is not sufficient an iridectomy may be required. If this treatment does not reduce the tension permanently, or at least for some time, extraction of the dislocated lens must be undertaken.

If there is a congenital or acquired relaxation of the zonula and the lens, more or less reduced and transparent, lies in approximately normal position in a hollow, the chief danger will be spontaneous dislocation of the lens into the anterior chamber. This danger may be prevented by warning the patient against all movements in which gravity would cause the lens to fall forwards by its own weight, as in stooping forwards. Moreover it is advisable to use myotics to keep the sphincter so well contracted that the transverse diameter of the pupil is considerably less than that of the lens. In most cases one or two drops of a one to two per cent. solution of pilocarpine twice daily is enough.

Uveal disease may appear in the form of circulatory disturbances and inflammations, being caused either by extension of disease or injury of the cornea or sclerotic, or it may be the result of some infective or general disease.

Further it may be the seat of tumours, or may be affected with displacements or disturbances in innervation. Prophylaxis for uveal disease, so far as such is possible, has already been considered under corneal ulcers and injuries.

For infective and general diseases as a cause of circulatory disturbances and inflammations reference should be made to the sections on scurvy, syphilis, tuberculosis, leprosy, relapsing fever, typhoid, malaria, cerebro-spinal meningitis and acute skin diseases, and also on anaemia, gout, diabetes, obesity, chronic nephritis and atheroma.

General prophylactic measures are absolute rest and avoidance of glaring light.

But this avoidance of glaring light must not be pushed too far, and the patient kept in dark rooms; it is only necessary to see that the light never exceeds that of ordinary diffuse daylight. The wearing of smoked glasses when out of doors, and keeping the sun rays out by yellowish grey blinds, is sufficient in most cases.

Disturbances of innervation will be considered under the prevention of functional disturbances. For tumours the ordinary rules of surgery hold good: the earliest possible removal of the tumour for the sake of the general health, and this means removal of the eyeball.

There is no prophylaxis for displacement of the uveal tract. In uveal disease we have then to deal rather with the prophylaxis of the consequences of the disease than with prophylaxis of the disease itself; and there are two chief forms of disease which permit of prophylactic interference: occlusion of the pupil after iritis and iridocyclitis, and sympathetic iridocyclitis. The former, so long as it lasts, exposes the eye to the danger of the development of acute increase of tension. In occlusion of the pupil, and when the vision is good, iridectomy is urgently indicated as a prophylactic. It will have to be done some time or other, and for the patient's sake it is better to undertake the operation while the eye is still free from irritation and the internal pressure normal, because the wound heals then much more easily and quickly.

Iridocyclitis, particularly when it is the result of some

injury, is very apt to cause an attack of sympathetic disease of the other eye. If the eye first attacked or injured is blind, it is advisable under all circumstances to enucleate it. Evisceration of the eyeball and neurectomy of the optic nerve have been proposed instead of enucleation, but its prophylactic value is not absolutely certain. If there is still some power of vision in the diseased eye we should postpone enucleation, and carefully watch the other eye. Above all the range of accommodation of the healthy eye and the pupil reaction should be tested frequently, because a removal of the near point and retardation of pupillary reaction are often the first signs of a threatening sympathetic inflammation. Moreover any photophobia, however slight, or injection must be noticed.

When sympathetic inflammation has set in it should be well considered whether enucleation of the eye first diseased should be undertaken as a prophylactic. If this eye still has sufficient power of vision to enable the patient to get about by himself, enucleation should not be done. Its effect after sympathetic inflammation has set in is extremely uncertain; the second diseased eye is nevertheless destroyed, almost without exception, while a cessation of the process in the eye first affected is not uncommon.

If on the other hand the eye first affected is completely or almost completely blind, enucleation should under any circumstances be performed.

Phthisis bulbi is always the result of injury or of uveal disease. The forms which follow upon suppuration of the cornea may in the main be ascribed to involvement of the uveal tract in the disease. Enucleation is upon the whole to be recommended, because every such eyeball carries with it to some extent the danger of sympathetic disease. The only exception would be where the eye is absolutely free from irritation and pain. But if there is constant or intermittent irritation, either much or little, or if it is tender or even painful, then enucleation must be performed under all circumstances.

In the different forms of primary glaucoma it is difficult to separate prophylaxis and treatment; for all treatment

of glaucoma, whether it be an acute or subacute or chronic glaucoma, is essentially prophylactic, because in most cases the changes which have already taken place cannot be undone, and the chief object of treatment is to delay the progress of the disease.

The following strictly prophylactic measures have to be considered in acute and subacute glaucoma: If the patient comes for treatment during the so-called prodromal stage, before the typical attack develops, he must be told to avoid all strong emotions and errors in diet. He ought not to overload the stomach with heavy meals, yet ought not to allow too long intervals between meals, and thus become very hungry: frequent meals, and little at a time, are best. Locally, the use of weak solutions of pilocarpine is to be recommended, a drop of a half per cent. solution in the evening before going to bed is best. The same course should be adopted when an attack of glaucoma has been cut short by treatment, because even the most successful iridectomy will not protect with absolute certainty against relapses.

For simple chronic glaucoma there is no prophylaxis apart from treatment, and this is therefore not considered here; and this applies also to congenital hydrophthalmos.

Some think that inadequate correction of hypermetropia, astigmatism and presbyopia is responsible for the development of glaucoma; others again regard nasal affections as possible causes. If we accept this view there is naturally a wider field for the prophylaxis of glaucoma.

The prevention of secondary glaucoma was described under the diseases of the cornea, lens and uveal tract which give rise to it.

Organic diseases of the retina and optic nerve are still less amenable to direct prophylaxis than are the forms of disease hitherto described. This arises from the nature of the circumstances under which these diseases, as well as those of the uveal tract, arise, for they never arise by themselves, but only as the result of some other disease or injury of the eye, or of some general disturbance; and this is probably true even in cases where the most thorough

examination does not determine its place of origin. We shall here consider the chief causes of such disease. Wherever prophylaxis seems possible particulars will be given under the original disease of the eye or the general disease. This section will deal only with organic diseases of the retina. Those disorders which do not cause any structural change in the retina, that is to say functional disorders of the retina and optic nerve, will be dealt with in the section on the prophylaxis of functional disease. Alterations in the circulation in the retina are caused by general circulatory disturbances which arise from heart disease, aneurisms of the aorta and of the carotid, or from compression of the large vessels going to the head by tumours. They are also seen in anaemia, chlorosis and exophthalmic goitre. The most important sign is arterial pulsation. If this sign be found it should be remembered that one of the above named diseases may be present. The only local eye disease in which arterial pulsation is present is glaucoma; but the symptom does not appear till the other signs of glaucoma are fairly well marked, and it is therefore of no prophylactic significance.

Constitutional diseases of the retina, which mostly appear as a diffuse retinitis with haemorrhages, may be caused by acute anaemia from sudden and great haemorrhage; it is also met with in chronic anaemia, secondary anaemia, pernicious anaemia, leucaemia, malaria, peliosis rheumatica, purpura and diabetes, and in malnutrition and scurvy; in the last two it is often associated with xerosis and night blindness. Infections and poisons are also very important in the aetiology of retinal disease. Septicaemia causes a retinitis which, as in the case of erysipelas, assumes the form of a peri- or endovasculitis. The orbital vessels may be extensively affected, so that exophthalmos is produced.

Syphilis and tuberculosis are among the most frequent causes of inflammation of the retina.

Among "intoxications" the chief are phosphorus poisoning, uraemia and extensive burns of the skin.

Emboli and thrombosis and also retinal haemorrhages follow upon valvular heart disease, leucaemia, pernicious anaemia

and diabetes. Atheroma of the vessels may cause retinal aneurism.

Marriages between near relatives have been followed by retinitis pigmentosa in the children.

The only retinal diseases which can to some extent be prevented by treatment are albuminuric retinitis, especially in the nephritis of pregnancy, and detachment of the retina.

The prophylaxis of albuminuric retinitis will be given under general diseases, so far as it relates to the eyes. Patients who are predisposed to detachment of the retina, or who have already a partial detachment of the retina, must be emphatically told to avoid all physical exertion which would send the blood to the head, and stooping, and they should give up all near work or use the eyes as little as possible for near work.

With regard to tumours of the retina which commonly appear in children in the form of glioma, it should be borne in mind that they show a great tendency to rapid growth and to extension to the optic nerve and brain, and enucleation as early as possible is therefore urgently indicated. At the operation one should, for prophylactic reasons, also remove as large a piece as possible of the optic nerve, and if microscopic examination of the central extremity of the excised optic nerve arouses any suspicions evisceration of the orbit should be performed at once.

What has been said about retinal disease applies also to disease of the optic nerve. Optic neuritis is often a sign of compression of the brain, and we may have to consider the question of trephining the skull as a prophylactic, to prevent total loss of sight during the rest of the patient's life, which is generally short.

Prophylaxis for a neuritis which is the result of a disease of the orbit has already been described.

Inflammation of the optic nerve at its ocular end or in its course (retrobulbar neuritis) occurs in meningitis, in infections and poisons, in pachymeningitis, cerebral softening, colds, and also in diabetes and atheroma.

The infective diseases which have to be considered are

chiefly tuberculosis, syphilis, diphtheria, the acute exanthemata, pneumonia and beri-beri. The poisons are alcohol, nicotine and lead.

Optic atrophy is the result of pressure at the optic foramen or in the orbit, or it may be due to locomotor ataxia or disseminated sclerosis, when it is not the result of inflammatory disease of the optic nerve. It has also been observed after severe haemorrhage.

It is self evident that the prevention of these diseases is impossible, except in the case of poisons. This is true also for diseases of the optic chiasma and tract and for disorders of the cerebral optic centres.

The prophylaxis of disease of the muscles of the eye will be given under functional disturbances and under general diseases.

(*b*) *Prophylaxis of Functional Disorders*

Functional disorders may be due to abnormalities in refraction, in accommodation, in muscular power, and in the various functions of the retina—that is, the form sense, light sense, and colour sense, both of the central and peripheral parts of the retina.

For the emmetropic eye no other prophylaxis is required beyond the general prophylaxis already described. Neglect to correct hypermetropia may be the cause of confused vision, of a lack of perseverance in work, hyperaemia of the conjunctiva with its consequences, spasm of accommodation, or supraorbital neuralgia moreover, it may cause convergent strabismus, and in rare cases divergent strabismus. It may also give rise to tonic and clonic spasm of the orbicularis muscle. Cataract and glaucoma are also said to be possible consequences. The only prophylaxis required is the choice of suitable spectacles. If the degree of hypermetropia found by examination (the acuteness of vision being normal) does not explain the severity of the symptoms complained of, it should be remembered that there may in addition be some functional neurosis, and that a relatively large proportion of the hypermetropia remains latent in consequence of spasm of accommodation. Atropine should here be used in order to determine the correct glasses.

It is then well, at least at first, to order glasses which are 0·5 to 1·0 D. weaker than those required to correct the amount of hypermetropia found when the eye was under atropine.

Here we must also draw attention to a point upon which sufficient stress is often not laid, namely the way in which the spectacles are made to fit. However carefully the glasses have been selected they will not fulfil their object unless they are properly centred. With glasses of higher powers the effect will be quite different according as the visual axis passes through the edge of the glass or through the middle.

In prescribing spectacles we should therefore carefully state the distance between the pupils and the height of the bridge of the spectacles relatively to the horizontal diameter, and the position of the latter relatively to the plane of the glasses. For prominent eyes it may have to be placed posterior to the plane of the glasses, while for eyes which are deeply set back it may have to be brought well forward; for a depressed nose the height of the bridge may have to be negative and lie below the horizontal diameter of the glasses.

It should be taken into consideration too for what purpose the glasses are required, whether for near work or for distance. If they are chiefly for distance the frame should be selected so that the wearer looks directly through the middle of each glass; if for near work, the slightly lowered visual line should pass through the centre.

The same results which may follow the non-correction or imperfect correction of hypermetropia may also appear in astigmatism.

To prevent these harmful results glasses to correct fully the defects should be prescribed for simple hypermetropic, compound hypermetropic and mixed astigmatism. For simple myopic astigmatism it is best for distant vision to make the myopic meridian emmetropic by a concave cylinder, but for near vision to make the emmetropic meridian artificially short sighted by a convex cylinder adapted to the dioptric value of the myopic meridian, in

order by these means to prevent accommodation efforts for near work. In mixed myopic astigmatism a concave cylinder should be ordered for near work, which makes the weaker refracting meridian equal to the stronger refracting meridian; whether then for distance the simple myopia should be fully or only partially corrected by addition of suitable spherical concave glasses will depend upon various points which will be considered under the prophylaxis of myopia. Myopia offers the widest scope for prophylaxis of all the functional anomalies.

Myopia is always the expression of a want of a proper relation between the length of the axis of the eyeball and the refractive power of the dioptric system, in the sense that the refractive power is too great compared with the length of the bulb. The want of proper relation arises either when the dioptric system has a normal refractive power but the bulb axis is too long, or when the length of the bulb is normal but the refractive power is too great. Both forms may be congenital or acquired.

In connexion with prophylaxis acquired increase in length of the eyeball is of special interest. This form of myopia will therefore first be described.

It is beyond the scope of this work to enter into the various theories about the development of myopia, but one statement is common to all these theories: the predisposition to the development of myopia is always congenital. One part, and probably the chief part, of this congenital disposition is an abnormal diminution in the capacity of the sclerotic to resist the normal internal tension of the eye.

In rare cases, from the very first year of life up to the death of the individual and independently of external conditions, this increase of length of the bulb regularly develops by a stretching chiefly of the posterior part of the bulb, with its attendant changes in the choroid and retina. This is the worst form of progressive myopia.

In by far the greater number of cases the development of myopia commences the moment the individual begins to use his eye for near objects; it is the result of near work.

Near work requires efforts for convergence and the tension

of accommodation. By the effort to converge an unequal pressure of the extrinsic muscles upon the eye is produced. By the tension of the muscle of accommodation the choroid is drawn forwards along its whole circumference, or stretched, and this must for purely mechanical reasons exercise a certain compression upon the vitreous body, although we have not yet succeeded in proving experimentally that there is a rise of pressure within the vitreous which this compression must theoretically produce and which is needed to explain the clinical phenomena.

In these cases where there is a congenital abnormal distensibility or congenital lack of elasticity of the sclerotic, the sclerotic is unable for two reasons to resist the tendency of the vitreous body to pass backwards under the action of this compression—on the one hand because the sclerotic does not offer sufficient resistance, and on the other hand because it does not retract well after having been stretched. Thus there arises a permanent increase in length of the axis of the globe. The result of this backward yielding of the sclerotic is to deprive the choroid more and more of the support which should protect it against permanent distension by the effort of accommodation. The first result of this is that the edge of the choroid which surrounds the optic nerve externally is drawn away. The more the eyeball is distended backwards the more marked will this retraction become. As the process goes on the other parts of the edge of the choroid which form a hole for the passage of the optic nerve will be drawn away from the nerve, and a circular staphyloma is formed. In its further course that part of the choroid behind the posterior pole is also drawn away, and "distension atrophy" of the fundus results. In the worst cases the next result is separation of the retina. The longer and more permanently such an eye makes efforts of accommodation, that is, the more near work such an individual does, the more rapidly and the more extensively will the changes be developed which have just been described.

In the large majority of cases it is the effort of accommodation and of convergence alone which produces these

results without any continued and useless contraction of the ciliary muscle after the near work has been done. This useless contraction of the ciliary muscle, "spasm of accommodation," is not now by most writers considered necessary for the development of myopia; some indeed maintain that it has nothing whatever to do with it.

Clinical facts however make me think that in a number of cases of acquired myopia spasm of accommodation is an important factor during periods when the myopia progresses. I am far from saying that the spasm of accommodation is in itself a cause of myopia, because we know that an eye may for a long period of time have ciliary spasm without becoming short sighted; but when it is added to a predisposition to myopia then it will tend to hasten the progress of myopia.

Eye work is necessarily, for physiological reasons, associated with hyperaemia. In a normal eye this hyperaemia ceases physiologically directly the work is finished, but it remains in an eye which is predisposed to myopia. This necessarily causes a disturbance of nutrition. How far this disturbance in nutrition completes the vicious circle and again increases the distensibility of the coats of the eyes or reduces their elasticity has not yet been fully explained.

The degree of myopia and the length of time during which it develops is very different with different individuals. From clinical experience we distinguish three groups, omitting cases of congenital progressive myopia mentioned before—

1. In the first group the myopia progresses till the distant point has moved to the ordinary working distance for that individual, and the further progress of the myopia then ceases by itself.

2. In the second group the myopia is progressive till the development ceases, that is till about the twentieth year of life and then ceases to progress.

3. In the third group myopia is progressive as in the congenital progressive form till the end of life.

In groups 2 and 3 the period of puberty seems to be

the most dangerous for increase of the myopia, particularly in girls.

In connexion with prophylaxis we have first to consider whether the tendency to development of short sight is or is not accompanied by any purposeless effort of accommodation or spasm of accommodation. In the former case prophylaxis must be therapeutic and hygienic so that in addition to suitable rules about near work, the effort of accommodation may be removed from time to time by a shorter or longer use of atropine while there is any tendency to progressive myopia.

In the large majority of cases on the other hand there exists no reason for a prolonged treatment with atropine. In the third group of cases mentioned above the action of atropine may be injurious because of the rise of intraocular pressure, however slight, which it may produce even in an eye not predisposed to glaucoma. In these myopic patients hygienic measures are alone applicable. The general rules to be observed to prevent shortsightedness are summarized by Fick as follows—

1. For near work (reading, writing and sewing) the distance of the eye from the object should be at least 13 inches, and the head must be kept straight and the visual plane be very little lowered.

2. The external conditions should be such that the whole functional capacity of the eye is not called forth, so that for example a diminution in the amount of light or in the size of the letters is still possible and will not make reading difficult or impossible. Work up to the maximum limit of functional capacity is a strain upon any organ and only possible for a short time.

3. Near work should not be continued for long periods at a time.

The measures to be adopted that the distance between the eye and the object may be right will be found under the general prophylaxis of eye diseases in the section "How we ought to work" (page 649). Mechanical means to maintain the body in the upright position are specially indicated for persons who have the habit of gradually

bringing their eyes closer and closer to their work. Many different forms of apparatus have been devised: head supports, chin supports, breast supports, and shoulder girdles to draw the body backwards, as well as a jacket apparatus. The form of apparatus which seems to me most practical I devised for my own son because the various forms of apparatus I tried did not answer the purpose. It consists of a transverse bar which is movable in the vertical plane and equal in length to the breadth of the chest of the patient, the breadth being measured from the tip of one acromion to the other. At each of the two extremities of this transverse bar there is a bar two to four inches in length at right angles to the transverse bar and resting against the sides of the body, and each of these side bars ends in a pad. The writer sits so that the two shoulders rest against the pads. The more the scholar rests against the pads, the more will the breast be distended, because it lies perfectly free between the two pads. It becomes therefore impossible to shift the body sideways, because directly the child moves to one side the instrument moves forward on to the chest and presses the body back, and thus increases the distance between the eye and the work so that the child will of itself resume again the correct position. The position of the book and the slant of the writing are also of great importance for the correct position of the body. Hermann Cohn remarks that with a badly constructed desk the child is compelled to sit badly, but that it can sit badly even in the best constructed desk. It is best in order to compel the body to keep upright that the book should lie in exactly the middle and that the writing should be upright. This combination of the position of the book and upright writing will completely prevent the favourite attitude of the child of sinking on the left, because the child can only write by moving the upper part of the body towards the right for each line he writes for a distance equal to the length of the line written. Writing is not so easy in this position of the book and with this slope of the letters as it is when the book and the writing are

slanting. But the hygienic value of this method of writing is so great that the longer time required to learn to write quickly is of comparatively trivial importance.

The connexion between the amount of light upon the work and prophylaxis will be found already given in the general section, and anything else to be said about it belongs to hygiene.

We will merely point out that reading in twilight and while riding is particularly bad for eyes predisposed to myopia.

The time devoted to near work has also to be considered in prophylaxis. The general rules about this so far as concerns schools are given by Fick as follows—

"Attendance at school should not commence till the child is seven years old. In the first year of school life instruction should not exceed sixteen to eighteen hours a week, and should be divided up into periods of not more than two hours. Between the two hours of any one period there should be a rest of a quarter of an hour. In giving instruction a distinction must be drawn between near work (reading, drawing and writing), and other work (learning by heart, gymnastic exercises, singing); near work must never continue for more than half an hour at a time. The number of hours may be gradually increased during the remaining school years. But there should always be a quarter of an hour's interval at the end of every hour, half an hour's interval at the end of every two hours, and a regular alternation between near work and other work. Never, not even in the highest class, may the number of school hours exceed thirty-two per week, and the number of hours of homework exceed fourteen, that is a weekly total of forty-six hours must not be exceeded."

It is obvious that these rules about work must be doubly strictly observed by individuals who show a tendency to become myopic or who are already more or less myopic.

We should take care too that so long as there is any tendency for the myopia to progress, shortsighted individuals should if possible work only in good daylight.

For myopic patients whose myopia does not progress

after the distant point has moved into the ordinary working distance or after they are twenty years of age, special prophylaxis for short sight is no longer required but the general prophylactic measures are alone needed.

The case is different when the myopia continues to progress. These patients should restrict the amount of near work for the rest of their lives and carry out the rules given above about the length of time they work and the size of the work.

These precautions are the more necessary because such eyes are specially predisposed to retinal and choroidal haemorrhages and to separation of the retina.

In the case of such individuals their short sight will have to be taken into consideration in the choice of an occupation. It is the easier to be guided by this consideration in choosing a vocation because in this group of cases there is already a high degree of myopia at the age of twelve or fourteen years, and the ophthalmoscopic examination shows the presence of a large staphyloma already at this age.

Heredity is very important in connexion with myopia, and the children of shortsighted parents should therefore be subjected to strict hygienic prophylaxis even before they show any signs of short sight. That form of short sight in which the length of the eyeball is normal and the lens has too high a refractive power relatively to the length of the bulb may have for its cause a too great refractive power of the lens which is congenital, or a swelling of the transparent lens in consequence of commencing cataract, or it may result from a tonic ciliary spasm. For the first two causes there is no prophylaxis; that for the last named will be described under spasm of accommodation. In all forms of short sight the selection of the correct glasses is a very important prophylactic measure. Opinions about this matter among ophthalmic surgeons are no longer so unanimous as formerly. A small number are of opinion that it is best when the myopia does not exceed 6 to 8 dioptres to correct the myopia fully both for distance and for near work, in

order thus to make the myopic eye equal to the emmetropic eye in convergence and accommodation.

These authorities deny that the effort of accommodation has any influence upon the progress of myopia.

But, as is evident from what I have already said, this is not the opinion which I hold. It appears to me to be contrary to all statistical and clinical observations, and the deductions of the upholders of full correction have not yet convinced me that my standpoint, which is also the standpoint of the majority of ophthalmologists, is wrong; and therefore in prescribing glasses I go upon the following principles. So far as prophylaxis is concerned we must first determine whether the myopia is greater or less than 6 or 7 dioptres. Then we must determine whether the case is one of pure myopia or of myopia increased apparently by spasm of accommodation or wholly simulated by it.

For myopia under 6–7 D. the following rules apply in prescribing glasses—

For distance full correction may be ordered.

For near work however glasses which fully correct the myopia must never be prescribed. The myopia may only be corrected so far that the distant point is at a comfortable working distance, that is 12 to 15 inches distant.

A distant point of 13 inches corresponds to a myopia of 3 dioptres.

If the myopia is less than 3 dioptres, that is if the distant point is greater than 13 inches, then the myopic eye should work without glasses. If the myopia is greater than 3 dioptres, the myopic person should be given glasses for near work which will reduce his myopia to 3 dioptres.

In this way the effort of accommodation is completely removed and an evil has thereby been eliminated which might otherwise cause the myopia to progress.

To give examples: A patient with a myopia of 2 D. would be ordered spectacles or eyeglasses of 2 D. for distance and be told to remove these glasses for all near work. His far point is at 20 inches; he is therefore able to see clearly without correction everything which lies

nearer to the eye than 21 inches. If, on the other hand, his myopia is 5 D., the far point is at 8 inches. If such a patient were to work without glasses he would be obliged to bend his body forward to work and would have to converge too strongly relatively in order to get binocular vision. We should therefore order the patient a glass for near work which is equal to the difference between 3 D. and 5 D., that is we should order glasses of 2 D. for near work.

If the myopia is different for the two eyes but neither eye exceeds 6 or 7 D., we should correct each eye separately according to the rules above laid down. As to the selection of spectacle frames see what has been said on page 684.

Thus for the lower and medium degrees of myopia general rules can be laid down in the ordering of glasses, but this is impossible for the higher degrees of myopia which exceed 6 or 8 D.; here we must individualize strictly.

Two factors have to be considered in individualizing: the greater or less tendency to progression of the myopia and the subjective sensations of the patient. Even adherents of the full correction view allow that in the higher degrees of myopia we meet not seldom with a decided reluctance to wear fully correcting glasses, which cannot be overcome by habit.

If with a high degree of myopia there is no special tendency to progression, and this can be determined with tolerable certainty by the condition of the fundus, we may try in ordering glasses to follow the same rules as for slighter degrees of myopia. But if the patient says that the glasses are uncomfortable, particularly for near work, we should give way to him and order weaker lenses. We find out from the patient the distance which he feels to be most comfortable for work, and prescribe concave glasses which will transfer the far point to that distance.

In deciding too upon glasses for distance we should not insist upon fully correcting the myopia but give the patient those glasses which he himself feels to be most comfortable. Stronger glasses than 12 to 14 D. are but seldom given for permanent use for distance. Patients who cannot bear the

full correction for distance should have eyeglasses to wear in addition, so that they may be able at least temporarily to get perfect vision.

If the ophthalmoscopic examination or prolonged observation shows that there is a great tendency to relatively quick increase of the myopia, we should then in these cases of high myopia not fully correct the myopia for distant vision, even though the patient does not find the strong glass uncomfortable. For these patients it is best if for ordinary use they have a lens which removes the far point to 6 or 8 inches, that is reduces their myopia to 4 to 7 D., and then use eyeglasses in addition for distance.

In general we may say that the higher the myopia the greater must be that part of the myopia which remains uncorrected.

We must here utter a warning against the habit of wearing an eyeglass which is a favourite habit among officers. Apart from the fact that they may cause spasm of the muscles of the eyelids and face, the exclusive use of one eye for distant vision is injurious. The habit of binocular vision too is lost.

Functional disturbance in the reaction of the pupils is significant in prophylaxis only in so far as its presence leads to the adoption of preventive measures against possible disease of the nervous system, even though the examination does not show what is the cause of the disturbance. It is therefore a matter of no concern as to which form of disturbance of pupil reaction is present.

Disturbances in the activity of accommodation may take the form of spasm, of paralysis or of weakness. Spasm of accommodation may be the expression of a purely local functional disturbance, the result of too prolonged or of too great efforts at accommodation, or it may appear as the result of functional neurosis. Prophylaxis for the latter, so far as any is required, will be given under neuroses.

Accommodation spasm may appear in two forms: a temporary spasm or a continuous spasm. Patients with temporary spasm of accommodation complain chiefly that after a long period of near work they cannot for a longer

or shorter time see well at a distance, and that power of clear distant vision returns gradually only after a time. With this sign there is generally associated a feeling of pressure and of dragging in the forehead, which increases the longer the near work is continued and disappears again when improvement in distant vision sets in.

In the second form the spasm is permanent. The characteristic complaint of the patient then is that he has become shortsighted in a relatively short space of time, or that his former short sight has quickly increased.

There is thus in both cases temporarily an apparent myopia caused by too great refraction by the lens. This may simulate myopia even up to 7 D. If the accommodation spasm affects one eye only, which is by the length of the eyeball predisposed to myopia, it may possibly accelerate the progress of these changes, and the high myopia which was at first merely functional may become a higher myopia and be based upon anatomical changes.

For the prevention of spasm of the accommodation the same measures are available as for the prophylaxis of myopia. In these cases the occasional use of atropine is of great value.

We must distinguish from spasm of the accommodation those forms of purposeless ciliary contraction which arise because the ciliary muscle has a certain tendency to contract beyond what is required. A clinical characteristic of these cases is that the patient complains that the longer he continues his near work the closer must he bring his eyes to the work. In these cases there is a want of agreement between the sight test and the objective determination of the refraction; that is the accommodation spasm relaxes in the dark room. This is because too much action of the ciliary muscle is called forth by the sight testing, that is by the effort to see clearly, and it disappears again naturally directly there is no longer any reason for the action of the muscle. In this form it is for prophylactic reasons most important to urge the patient not to give way to it; and whenever he feels the need of getting his eyes closer to his work he should cease work for a few minutes and look into

the distance. It is in these cases that some mechanical support to keep the patient up or the Bâle spectacles already mentioned are very useful, because the patient is thereby prevented from unconsciously yielding to the desire to bring his head close to his work. To this category belong also those cases described by Peters among others, in which children seem to be shortsighted when glasses are placed before their eyes, but finally are found to have normal vision through plain glasses, though without these plain glasses they say they cannot see clearly. There is a unanimous opinion among observers that this is no simulation, and the explanation of these cases is probably that in consequence of some mental process a disproportionate effort of accommodation is made when the eye is not covered by a glass, and that this auto-suggestion ceases as soon as a plain glass is placed before the eye.

In addition to suggestion treatment I have found it useful as a prophylactic to order a plain glass and sometimes even a weak convex glass, because auto-suggestion is thereby removed and the apparatus for accommodation returns gradually to its normal activity.

Paralysis of accommodation, when not caused by drugs applied locally, is always the result of a general disturbance. It may be due to poisoning by atropine and similar alkaloids and to poisoning by fungi, deadly nightshade and by sausages (botulism). Paralysis of accommodation may also be a sequela of diphtheria, and may occur as unilateral or as bilateral paralysis in cerebral syphilis and (rarely) in hysteria. Prophylaxis is only of value here in the same way as in disturbances of the pupil reaction. Weakness of accommodation may occur in two forms—

1. A true weakness of the ciliary muscle, the lens still retaining its elasticity.

2. An apparent weakness due to rigidity of the lens.

True weakness is the earliest local sign of a threatening sympathetic ophthalmia and is in this case a valuable symptom in regard to prophylaxis.

True weakness of accommodation may also be the result of debilitating general disease and of debilitating physiological

conditions (such as menstruation and pregnancy), and of hysteria and neurasthenia. When the weakness has resulted from some general organic disease it is necessary, as a prophylactic, to reduce near work as much as possible, limiting it to very short periods, at most ten to fifteen minutes, and alternating these working periods with periods of rest of at least the same length of time. The time during which the individual can read without feeling uncomfortable is an indication of the length of time that near work may be permitted. When there is marked weakness near work must be forbidden absolutely. On the contrary when the weakness of accommodation is caused by neurasthenia and hysteria, it is of prophylactic value to urge the patient to do some near work in order that this feeling of weakness may not become fixed. Suitable "waking suggestion" is the best prophylaxis in these cases, in addition to treatment of the general cause. Obviously refractive errors if present must be properly corrected.

The weakness of accommodation which is the result of rigidity of the lens appears as the well known presbyopia of advanced life. Here it is important as a prophylactic not to delay prescribing correcting spectacles until more troublesome symptoms arise; that is to say spectacles should be ordered as soon as possible. If this is not done, particularly in those of nervous disposition, troubles from accommodative asthenopia will arise, similar to although not so marked .as those described as a consequence of uncorrected hypermetropia. The same remarks apply to the necessity for ordering stronger glasses as occasion arises. This is the more important since, in the opinion of some ophthalmologists, an uncorrected or insufficiently corrected presbyopia tends to produce cataract and glaucoma.

Functional disturbances in connexion with the activity of the retina appear in the form of hyperaesthesia and hypaesthesia and anaesthesia. These terms include all functional disorders of the retina, because photophobia is hyperaesthesia; amblyopia, disorders of the sense of light, of the sense of colour, and disorders of the peripheral visual powers, and night blindness, fall under hypaesthesia and anaesthesia.

These disorders are for the most part either congenital or the result of organic disease of some part of the eye, or the result of general organic and functional disturbances. Important among the functional disturbances are neurasthenia and hysteria, and disturbances of every kind connected with the generative organs. Details about prophylaxis, so far as this is possible, will be found in those special chapters.

Here we shall mention only two forms of functional disturbance of the retina for which prophylaxis is admissible, but only up to a certain degree in the second form. These are the slighter forms of dazzling by light and temporary scotoma. The prophylaxis of the severer forms of dazzling has already been given under general prophylaxis. The slighter forms of dazzling are characterized by after images of shorter or longer duration after looking at circumscribed objects which are too strongly illuminated, or by a temporary diminution of the retinal sensibility for normal illumination, as is the case for example when one goes into the shade or into a house after walking along a sunny road for a long time. This slight form of dazzling may also appear when one works with the source of light, either window light or artificial light, streaming directly into the eye; moreover these slight forms of dazzling may arise when the work is directly played upon by the sun.

The result of these milder forms of dazzling may be, in addition to the above named temporary diminution in sensibility under normal illumination, a hyperaemic condition of the eye and supraorbital neuralgia.

The prophylaxis is very simple. To prevent dazzling by the sun out of doors one should use a sunshade, or wear lightly smoked glasses if obliged to remain out in the sun for a long time; and in working one should sit, as was pointed out under general prophylaxis, in such a position that the source of light does not send its rays into the eyes, and that the sun does not shine upon the work.

In a few cases very troublesome symptoms of dazzling appear also when the side light enters the eye; and here protective flaps fastened to the sides of the spectacles are

useful. For these cases "marginal protective spectacles" have been devised by Schmidt-Rimpler.

As to the cause of transient scotoma there are very different opinions. This is not the place to enter into the various hypotheses, and I shall therefore avoid mentioning transient scotoma under general disorders which are stated to be a predisposing cause of it.

As to prophylaxis we must find out the exciting cause. In a number of cases transient scotoma comes on when there is a sensation of intense hunger. The prophylaxis here is never to allow the stomach to be quite empty, but to eat a little from time to time between meals, be it only a piece of bread or chocolate or biscuit. In other cases transient scotoma is the result of acute abuse of alcohol and tobacco, or occurs after debilitating excesses, especially sexual. Here prophylaxis is very simple, namely moderation.

For forms of transient scotoma which arise without any evident cause there is naturally no prophylaxis.

Disturbances in the function of the ocular muscles occur as strabismus, paresis, paralysis and spasm.

Strabismus is the result of errors of refraction and of great difference in the acuteness of vision of the two eyes, whether these be congenital or acquired. For the latter there is not much that can be done by prophylaxis. But prophylaxis is possible in strabismus when it is caused by anomalies of refraction if the measures be adopted in time.

Convergent strabismus is mostly the result of a more or less high degree of hypermetropia, and develops generally between the second and fourth years of life, at the time when the child begins energetically to accommodate. If the patient is brought to the physician at this period when the squinting is as yet only periodical, its further progress may be prevented by ordering suitable convex glasses. In ordering the glasses it is best to relax accommodation by atropine, and then estimate the refraction by retinoscopy, because it is very difficult to apply visual tests at this age. If for any reason spectacles cannot be ordered, we must at least try to teach the little patient to use his eyes equally, in order later when curative, that is operative, measures are adopted, to

make it easier for him to acquire binocular vision. This is best done by covering the non-squinting eye every morning and evening for half an hour in order to make the squinting eye act for a time at least.

Divergent strabismus when due to an error of refraction is generally the result of high myopia. Here too the best prophylaxis is the wearing of suitable spectacles.

Weakness of the ocular muscles may result either from an error of refraction, mostly myopia, or from general diseases. Among the latter are debilitating diseases and functional neuroses. The prophylaxis of these will be given under the general diseases.

The prophylaxis of the former cannot really be separated from treatment, but will be considered here because with the removal of this weakness of the internal recti in myopia there is associated a prophylaxis against the unfavourable influence of this muscular activity upon the progress of myopia. In these cases it is of prophylactic value to reduce or remove the activity of the internal recti by using a prism in the spectacles, because when the contraction of the internal recti is thus reduced, the antagonistic tension of the stretched external recti is also removed. The principles to be followed in this belong to therapeutics in the narrower sense, and will be found in text books upon ophthalmology.

For paralysis of the ocular muscles, whatever be the cause, there is only one prophylactic measure, the affected eye should be prevented from seeing by placing in front of it a nontransparent glass. If this is not done the endeavour to get single vision will on the one hand produce spasm of the antagonists, and thus favour the development of a squint, and on the other hand the patient is obliged to hold the head on one side in order to fuse the images, and this may cause spasm of the neck muscles.

Spasmodic conditions of the ocular muscles are, like paralysis, either the result of general disturbances and will be mentioned under that heading or are the result of anomalies of refraction. If examination shows that the refraction is abnormal, especially if hypermetropia is caus-

ing the spasm, then therapeutics and prophylaxis are one and the same, namely correction of the refraction.

Nystagmus can only be influenced by prophylaxis when it is acquired. Details will be found in the section on trade diseases (eye disease in miners).

(c) *Prophylaxis of Diseases and Functional Disturbances which arise in the Course of General Diseases*

Under special prophylaxis we had occasion to mention all the diseases of the eye in the preceding chapter, but this separate section will be devoted to the connexion between general disease and disease of the eye, because one and the same general disease may often produce very different diseases of the eye, and in order to take a rapid survey of those eye diseases which may be prevented it seems necessary to group the possible eye diseases.

It is obvious that all these eye diseases cannot be prevented; indeed one may even say without exaggeration that the number of these preventible diseases is comparatively small. But if we are prepared for the possible development of an eye disease during the course of a general disease, we shall at least be in a better position successfully to prevent its further progress than we should be if the complication came upon us by surprise and was therefore, in its initial stage, overlooked or disregarded. A correct prognosis is in these cases not seldom the best prophylaxis.

Those diseases which admit of special prophylaxis with regard to eye affections will be described in detail. In the case of diseases in which prophylaxis of the eye disease is identical with prophylaxis of the general disease we shall refer the reader to that special section of the book. In cases where prophylaxis is not possible we shall merely make a reference to the eye diseases which may arise.

The fact must here be specially emphasized that the eye affection is not seldom the first sign of a threatened general disease, and that a correct aetiological diagnosis of the eye disease often gives a valuable clue for the prophylaxis of

the general disease. Let us first consider acute infective diseases.

Measles and scarlet fever may give rise to conjunctivitis, inflammation of the cornea, fibrino-plastic cyclitis, panophthalmitis and optic neuritis. Conjunctivitis occurs almost without exception in these diseases. Often indeed conjunctivitis is the first symptom of the general disease. It is therefore important during epidemics of measles and of scarlet fever to pay greater attention to conjunctival hyperaemia and to conjunctival catarrh in children; this will often enable us to take early prophylactic measures in respect to the general disease. On the other hand the fact that almost every case of measles and scarlet fever is accompanied by conjunctivitis should not deceive us so as to make us regard every affection of the eyes in these diseases as a conjunctival catarrh. The early ordering of antiseptic eye lotions, especially of a solution of corrosive sublimate (1 in 5,000) and the use of a two per cent boric acid ointment will probably prevent many a severe complication.

So far as is known varicella never leads to any serious complication, and no special prophylaxis is therefore required.

The case is very different with variola. Pustules upon the eyelids may lead to trichiasis, to loss of the lashes and to ectropium; pustules on the conjunctiva may give rise to extensive scar tissue and deformities, and even to xerosis of the conjunctiva and the serious affections of the cornea following it. Moreover, as in the case of measles and scarlet fever, cyclitis, panophthalmitis, and optic neuritis may occur.

Recently it has been stated that the scarring by smallpox is much less severe if the patient is kept constantly in red light. If this statement is confirmed, it would seem to be of prophylactic value to keep out the daylight by red curtains or red veils. Here too it is probably of use also to order antiseptic eye lotions early.

Vaccinia may also lead to extensive distortion by scarring through pustules on the eyelids and conjunctiva. We should therefore take precautions in the case of those who

have been vaccinated, that the vaccine is not conveyed to the eyes by contact with the arms.

In facial erysipelas conjunctival irritation and inflammation of the eyelids occur almost without exception but without leaving any serious consequences. But if the process extends to the orbital cellular tissue or to Tenon's capsule the most unpleasant complications may arise. If proptosis occurs the measures already given for that condition must be adopted. The most serious result, which cannot unfortunately be prevented by prophylactic measures, is when the process extends to the optic nerve. Optic atrophy is then almost without exception the final result. The same result occurs with retinal inflammations which appear in the form of a perivasculitis and endovasculitis.

Prophylactic measures against conjunctivitis in diphtheria have already been given. Prophylaxis for the other sequelae of diphtheria, namely paralytic mydriasis, paralysis of accommodation, panophthalmitis, and optic neuritis, is identical with the prophylaxis of diphtheria. Prophylaxis is powerless against the sequelae of influenza, namely conjunctivitis, interstitial keratitis, iritis, neuritis, retrobulbar haemorrhages and panophthalmitis. Early diagnosis and early treatment are alone of avail. This is also true for rheumatism, both acute and chronic, with its sequelae, namely diseases of the uveal tract, sclerotic and optic nerve, as well as for the panophthalmitis which appear in peliosis rheumatica, epidemic parotitis and Weil's disease.

Neither can anything be done by way of prophylaxis in whooping cough with haemorrhages into the eyelids and conjunctiva, and its temporary visual disorders and blindness; nor yet in the inflammations of the orbital connective tissue and of Tenon's capsule, and in the panophthalmitis and retinal inflammations which are attributable to pyaemia, septicaemia and puerperal fever. Typhoid, typhus and cerebro-spinal meningitis may lead to iritis, cyclitis, panophthalmitis and optic neuritis; here too prophylaxis is not possible. On the other hand prophylactic measures may be of the greatest value in the conjunctivitis and keratitis which occur in these diseases when the drowsy

delirious patient does not close his eyelids, and the conjunctiva and cornea are exposed to the drying effect of the air and to the irritation of particles of dust and of organisms suspended in it. Here it is advisable frequently to smear the palpebral fissure with a two per cent. boric acid ointment and to keep the eyes covered with compresses dipped into a weak solution of corrosive sublimate.

In relapsing fever and malaria we may meet with iritis, cyclitis, retinitis and visual disturbances, especially temporary homonymous hemianopia, and these require the ordinary prophylactic measures for the general diseases.

Subacute and chronic infective diseases probably furnish the largest number of cases of eye diseases which are dependent upon general disease.

This holds good for acute malaria and also for malaria which has become chronic.

Chronic gonorrhoea leads in rare cases to extensive disease of the uveal tract. Prophylaxis here is obviously that of the gonorrhoea. Prophylaxis against the direct transference of gonorrhoea has already been mentioned. Syphilis is a cause of ostitis and periostitis, papules on the eyelids, infiltration of the tarsal cartilage, disease of the lachrymal ducts and conjunctiva, interstitial keratitis and scleritis. Moreover it leads to all kinds of diseases of the uveal tract, retinitis and optic neuritis, and when it has attacked the brain to disturbances of accommodation and muscular action. The prophylaxis is obviously that for the syphilis. It is important in all these forms of eye disease to think of a possible syphilitic origin. For in many cases the eye disease is the first sign of a general infection having occurred, and it is most important in these cases that the eye affection should lead to the adoption of an energetic general treatment in order to prevent further consequences of the infection.

The same is true of tuberculosis which may lead to the same diseases as syphilis. The differential diagnosis between syphilis and tuberculosis often presents the greatest difficulty. The difficulty is the greater because mixed infection not rarely occurs in eye disease. As to

prophylaxis, what was said about syphilis is applicable here too.

The same considerations apply also to leprosy.

Scrofulosis is best considered after these diseases, because it is mostly the result of tuberculous or syphilitic disease in the parents when not a result of unfavourable conditions of life. There is, moreover, very little to be said about it here; the main general considerations will be found in the chapter on the prophylaxis of disease in children, and the eye affections have already been dealt with in the section on organic disease of the eye.

By early treatment of diseases of the nose, throat and adjacent cavities, very many eye diseases may be prevented. Although we do not go so far as many do and attribute cyclitis, iritis, glaucoma, cataract, myopia and strabismus to nasal affections, yet there is no doubt that diseases of the nasal and pharyngeal mucous membranes may cause increase in the secretion of tears, and disease of the conjunctiva, cornea and lachrymal ducts. When the pharynx is occupied by adenoid growths or polypi, we not rarely meet with asthenopic troubles, conjunctival, accommodative as well as muscular, and supraorbital neuralgia. In rare cases optic neuritis has also been observed as a sequela of nasal disease.

Here there is great scope for prophylaxis, and early and careful treatment of these diseases is the more important in regard to diseases of the eye, because it is probably true that all these diseases must sooner or later cause one or more of these affections of the eyes, which will then be a cause of further eye disease. The same is true of diseases of the adjoining bony cavities which may by extension lead to serious disease of the orbit, and relatively frequently to optic neuritis.

In empyema of the frontal sinuses and of the antrum of Highmore, purely functional limitations of the visual field have also been observed.

Disease of the eye following tooth extraction or disease of a tooth can be most easily explained by extension of the disease by way of the antrum of Highmore.

Prophylaxis is powerless to prevent eye diseases which may follow disease of the lungs: such as herpes of the cornea, panophthalmitis and optic neuritis in pneumonia, and haemorrhage into the eyelids and conjunctiva, vitreous body and orbit in emphysema and disturbances of the pulmonary circulation.

Neither can we prevent disease of the eyes which is a consequence of disease of the heart and vascular system. We should always remember that such patients are greatly exposed to the danger of emboli and thrombosis of the optic nerve and retina, and to retinal haemorrhages. Cataract and glaucoma, as well as haemorrhage into the vitreous body, and degeneration of the retinal and choroidal vessels, also occur in circulatory disturbances and in atheroma of the vessels.

The remarks made in the introduction to this chapter apply strongly to these last named diseases, namely, that the development of the disease of the eye is often the first symptom leading to the discovery of the general disease and thus makes it possible to prevent the further progress of the general disease. This is often the case with abnormal pulsation of the retinal vessels, discovered by mere chance during the ophthalmoscopic examination of the eyes for some other purpose, possibly for some error of refraction. If such an examination reveals an arterial pulsation, or in the absence of local increase of blood pressure a venous pulse, we must always bear in mind the possibility of aortic insufficiency or of insufficiency of the tricuspid valve. An aortic aneurism may also produce arterial pulsation in the retina. But we must not forget that anaemia or chlorosis may also give rise to this symptom.

These remarks are equally applicable to eye disease which is the result of kidney disease, especially iritis and albuminuric retinitis. In these diseases, too, prophylaxis is possible, though to a more limited extent, in the sense that careful observation of the eyes of patients with renal disease makes it possible at the very first signs of eye troubles to cut them short by energetic treatment of the general disease.

When disease of the kidneys has been diagnosed the

patient should be told about the possibility of the development of retinitis so that he may seek medical advice directly the very least visual trouble arises.

With regard to nephritis and retinitis which are the result of pregnancy, reference must be made to the prophylaxis of the diseases of the genital organs.

Diseases of the digestive tract are somewhat less important. The chief eye troubles are forms of night blindness in hepatic disease and yellow vision in jaundice. Here again the eye disease is often the symptom which leads to the prevention of the further progress of the general disease. Many a case of hepatic disease might be diagnosed by a correct interpretation of the ocular symptoms and its further progress be checked. In disease of the stomach and in chronic gastric and intestinal catarrh there is weakness of accommodation and of the ocular muscles. In cholera infantum diseases due to the general weakness and to the drying of the cornea appear, and the prophylaxis is that already given for typhus.

A large number of eye affections may be caused by diabetes mellitus. The various forms of cataract and retinitis should suggest an examination of the urine. The retina is subject to a specific form of retinitis in diabetes; but sclerotitis, iritis, choroiditis and thrombosis of the central vein of the retina may also be the result of diabetes. In a case of diabetes the possibility of the development of these eye affections should be borne in mind. There is no prophylaxis against these eye affections except adequate treatment of the primary disease; but these eye affections can be influenced by energetic treatment of the primary trouble and the further progress of the disease be prevented in many cases or at least delayed. The fact is important that the development of the eye affection often leads to the recognition of the primary disease.

Homonymous hemianopia may occur in diabetes insipidus.

Anaemia and chlorosis may cause accommodative and muscular asthenopic troubles, especially when such patients do work which strains the eyes. These patients and con-

valescents after debilitating and febrile diseases should therefore be taught to use their eyes hygienically; above all we must forbid long continued reading or sewing.

Directly symptoms arise the eyes must be completely rested. Much can be done for these patients by prophylaxis. Prophylaxis is, however, useless for the more serious organic disorders, such as neuritis, haemorrhage into the retina and serous iritis.

Very careful prophylactic treatment for the eyes is required in anaemic and chlorotic patients if at the same time they suffer from myopia, because experience shows that myopia sometimes increases rapidly under these conditions.

Recurrent haemorrhages into the vitreous are relatively frequent in anaemic badly nourished young people. In pernicious anaemia and leucaemia and in melanaemia prophylaxis can do nothing for the eye affections which develop, namely haemorrhages into the retina and choroid, and, in the case of leucaemia, also lymphoma of the conjunctiva and orbit.

Gout and chronic rheumatism lead to conjunctivitis, iritis and choroiditis; there is no local prophylaxis. The same is true of cataract and choroiditis in obesity. Malnutrition and scurvy cause different diseases: the former causes xerosis of the conjunctiva and night blindness, the latter gives rise to haemorrhage into the conjunctiva, corneal ulcers and retinal haemorrhage. The prophylaxis is obviously that of the general disease.

Skin diseases on the face and near the eyes require, without exception, very careful watching and thorough treatment to prevent extension to the eyes. Especially in boils and carbuncles we must remember that extension of the morbid process to the orbital fatty tissues may produce the most serious results for the eye. The prophylaxis is not special, but is that comprised in general prophylaxis for the particular skin disease.

The same is true about parasites. There is no prophylaxis for eye disease caused by trichinosis, cysticerci, ecchinococci and filaria. Pediculi require energetic measures, because they may make their way to the eyebrows and eyelashes,

and cause tedious eczematous diseases and chronic hyperaemic conditions of the edge of the eyelids.

The general diseases which are the most frequently associated with eye disease and functional disturbances are diseases of the brain and nervous system. There is obviously no prophylactic treatment in these organic diseases which is capable of preventing the eyes from becoming implicated in the morbid process. The main point again here is the fact that a correct interpretation of the eye disease frequently leads to the diagnosis of the threatening or commencing general disease at a time when there are as yet no general symptoms. It happens not seldom that one who is suffering from commencing tabes dorsalis, paralysis, or disseminated sclerosis, or one who is suffering from cerebral syphilis comes to the ophthalmic surgeon for some paralysis of accommodation or paralysis of an extrinsic muscle or visual disturbance of some form, long before he himself or his friends notice any other sign of the general disease. In any case of disturbed accommodation which cannot be explained by the age of the patient, or any change in the reaction of the pupils, or paralysis of an ocular muscle, or disturbance of central or peripheral visual capacity, where the ophthalmoscopic examination is negative or shows optic neuritis or atrophy, the surgeon should most carefully examine the entire nervous system or see that it is examined.

The only diseases of the central nervous system which admit of any direct prophylaxis for the eyes are the so-called functional neuroses, neurasthenia and hysteria. Prophylaxis must here above all be educational or suggestive. If such a patient comes for treatment and it is absolutely certain that there is no organic disease to cause the eye trouble, it is best to listen as little as possible to the complaints of the patient and to assure him from the very first that the trouble is not very serious and can be cured. In this way we can prevent the patient from harping too much upon his condition and getting more severe eye symptoms. How careful we must be in this respect is shown by the following example. Some time ago I pointed out to my assistant physician a slight twitching of the orbicularis in an

hysterical patient suffering from a slight conjunctival catarrh. Next day the patient came with a well marked spasmodic ptosis of the eye on which I had demonstrated the twitchings, but the other eye remained free, although here too slight twitching had been present several days. Massage of the eyelids and parts around the eye quickly removed the ptosis, because the suggestion was associated with it that the spasm would at once be removed thereby. In other respects the prophylaxis is in general that of hysteria and neurasthenia, and the reader is referred to the section on diseases of nerves.

What has been said about the prophylaxis of neuroses applies also to the prophylaxis of those disturbances in the genital organs which appear generally in the form of eye strain. Here eye disturbances do not, as a rule, appear until other nervous disturbances have manifested themselves as the result of the disease.

Special prophylaxis is needed for the eyes during menstruation and pregnancy, as was pointed out under general prophylaxis.

If menstruation is normal and there are no disturbances in the region of the genital organs, prophylaxis is needed only for individuals who have a tendency to progressive myopia. Experience shows that amongst girls and also amongst boys, when there is a tendency to progressive myopia it advances rapidly during the period of development. The eyes of these individuals should therefore receive very careful attention, and the precautions already given on page 685 should be strictly carried out. During the menstrual period these girls should give up all near work. When this period of development has been passed these very strict prophylactic precautions may be relaxed, but absolute rest during the few days of the menstrual period should if possible be the rule for the rest of the life of these individuals.

If disturbances are present at the menstrual period, and menstruation is irregular, or there is some general trouble, such as chlorosis, which has an unfavourable influence on these functions, then all over exertion of the eyes which are otherwise healthy should be avoided by such individuals

during the menstrual period; because even if there is no fear of short sight, yet overstrain of the eyes during the menstrual period may cause those symptoms more or less, which are sometimes comprised under the term copiopia symptomatica.

The same remarks apply also to pregnancy. That which holds good for the menstrual period holds good also for the whole period of pregnancy, particularly for the early months. If during pregnancy a nephritis develops, with retinal disease, the artificial induction of abortion is indicated. But this is the only indication where an eye affection requires the induction of labour. Above all we must take care not to sanction the induction of labour because the patient complains of increase of purely functional disturbances, or of some other disease of the retina or uvea. Very frequently the desire to avoid an inconvenient increase in the number of children or the unpleasantness of pregnancy is the cause which suggests the increase of eye symptoms.

Symptoms of eye strain are common in endometritis, parametritis and perimetritis. There is no prophylaxis except treatment of the primary trouble.

Onanism and sexual excesses may also cause eye affections. The symptoms caused by the former are slight conjunctivitis, slight insufficiency of the internal recti, slight weakness of accommodation, flickering and slight photophobia, and it is characteristic that the troubles are out of proportion to the objective condition. In sexual excesses the same symptoms appear, but there is also ciliary pain and a tendency to scotoma. The only prophylaxis possible is to put an end to the vicious habits. But in order that this may be done a knowledge of the symptoms is essential and they have therefore been given here.

2. *The Prophylaxis of Eye Affections due to Occupation, to Accidents and to Poisons*

We bring together under one chapter these diseases due to occupations, accidents and poisons, but this is not because these injurious effects occur only during work. The reason we put them together is, that though apparently

of different nature yet they stand in intimate relation to one another. On the one hand a number of cases of poisoning occur only to those who work at certain trades; on the other hand working at a certain trade so often causes eye injuries that we might almost look upon these particular eye injuries as characteristic of that trade.

If we were to separate these instead of dealing with them as a whole in one chapter, a large number of cross references would be required which can thus be avoided. Upon the whole moreover only those injuries can be certainly prevented which are caused by following the trade itself, because they alone can be foreseen. All such injuries which occur apart from trade are, with the exception of poisoning by alcohol or by tobacco, more or less accidental conditions which cannot be foreseen and cannot therefore be avoided. In the following pages we shall therefore first mention trade diseases and poisoning caused by the work, as well as wounds thus produced. Then we shall consider the prophylaxis of injuries and poisons due to causes not connected with occupations, so far as prophylaxis is possible in these.

First the question to be answered is: wherein lies the difference between trade diseases and trade accidents? Trade disease is an injurious condition which is so closely related to the work that it invariably appears after one has worked for a longer or shorter time at the trade, and cannot be prevented by precautions, or if it is accessible to prophylaxis will appear under all circumstances if such precautions are neglected. That individual predisposition plays a large part in this is obvious. One individual soon gets ill, another only after a long time, though the conditions have been the same. In some diseases the nature of the disease depends mostly upon individual predisposition: the same injurious conditions may produce spasm of accommodation in one individual while in another it produces myopia.

Further a distinction must be made between *direct* injury to the eye, in which the work has caused disease of the eyes only not accompanied by any injury to the general health, or at least not necessarily so accompanied; and

indirect injury, in which disease of some other part of the body or a general disease always precedes the eye trouble, although it may be the eye trouble which first brings the patient to the physician. Trade accidents on the other hand are those injuries which do not necessarily follow the occupation, even though all precautions be omitted. Predisposition is not here concerned. It is essentially an accidental occurrence that is the cause.

Trade diseases of the eye may be external organic diseases or functional disorders, or may be secondary organic and functional disturbances mostly the consequence of infection.

Among external organic diseases we have chiefly to consider conjunctivitis, and in association with this disease of the cornea with its secondary phenomena. These may arise in any trade in which the air of the workroom or the air near the workman is rendered impure by smoke, dust, soot, or other small particles. The general precautionary measures required are the same as those for similar conditions which appear apart from trade, and the special precautions to be demanded for those who are engaged at such trades are that the rooms should be thoroughly ventilated by the introduction of fresh air and the removal of the impure air, and that accommodation should be provided for the workpeople where they can change their clothes, wash and bathe, and thus cleanse themselves several times during the course of the day, or at least on leaving off work. In occupations where the dust produced by the work is of a very irritating nature, as in the manufacture of chemical products (for example cantharides), there should be suitable contrivances to catch the dust so that as little of it as possible may get into the air of the workroom. Sometimes it may even be necessary to adopt the use of special protective glasses or protective hoods as a direct protection of the eyes and respiratory organs. Details about the forms of protective hoods and glasses will be found at the end of the section on the prophylaxis against accidents (p. 720).

Functional disorders occur from overstrain of accommodation or sight, and as the result of insufficient light or enforced abnormal position of the eyes; also as the result of

dazzling which may in some cases be combined with organic injury through radiant heat.

The first kind of functional disturbances caused by overuse of accommodation and of sight may occur at any trade where long continued near work at small objects is required. It affects more especially compositors (who in addition often suffer from lead poisoning), lithographers, wood-engravers, copper-plate engravers, designers, photographic retouchers, goldsmiths and jewellers, and needlewomen and those who work at embroidery. The injurious conditions met with in these trades are the same as those mentioned as functional disturbances under general prophylaxis, and under the special prophylaxis of functional disorders.

One only of the essential conditions enumerated under general prophylaxis will be found impossible to secure at some trades, namely the condition that light should enter from the left. In a number of occupations it seems necessary that the light should enter from the front; this is especially the case when both hands are used equally, as with goldsmiths and jewellers and diamond cutters. In these cases the light should be prevented from entering directly into the eye by wearing a shade to protect the eye, or by arranging a shade over the work table. These injurious conditions of near work are increased, especially in women, by other indirect injuries which result from the sedentary nature of the work and the constant bending forwards. These are chiefly anaemia and chlorosis, and in women disorders of the pelvic organs. Details will be found under eye diseases which are produced by general disturbances. A special form of injury arises from threading the needles in embroidering by machinery. School children are often employed for this. The needles are as thick as an ordinary embroidery needle, three-quarters of an inch long, pointed at both ends and with the needle eye in the centre. The work is very trying to beginners and the eyes soon get tired. These children all complain that their eyes soon tire when they are learning this threading; they get red and the tears overflow; and sometimes the children complain of headache. When practised at the work they rely more

upon the sensibility of their finger tips and these symptoms disappear. If there is predisposition to short sight myopia soon develops or gets worse. As a prophylactic, we should demand that inexperienced workers be allowed to rest often during the work; and children who have a tendency to short sight should not be allowed to do this work.

Watchmakers and workmen who do very fine and exact mechanical work are compelled to work in a special way. They work for the most part with magnifiers and thus use one eye only; the result is they soon learn not to use the other eye, and relax its accommodation. In the course of time the working eye develops a certain weakness of accommodation, the internal recti become insufficient and there is a weakness of convergence. The same result occurs among goldsmiths and jewellers who work with magnifiers, and also among wood engravers. No special prophylaxis is possible, neither is it very necessary because the injury is a comparatively trivial one and may easily be undone by proper spectacles.

The constant strain of looking upwards while working causes nystagmus in miners, who are often obliged to work lying on their backs. The development of the disease is still further helped by the bad light and food. Among workers in foundries night blindness is not rare. Prophylaxis requires that the periods of work should be short and the food good.

Disease caused by dazzling occurs among those engaged in electric work, and in places where iron is welded by electricity. The disease thus caused corresponds exactly with that spoken of already as caused by invisible rays.

Among those who work close to fires, especially glass-blowers, cataract is frequently found to develop through the constant action of the radiant heat; as a prophylaxis protective spectacles should be worn as described below in the section on protective spectacles.

The secondary injuries to the eyes caused by work are without exception injuries produced by poisons. Lead and

arsenic poisoning are met with in painters, whitewashers, typefounders, plumbers, and among workers in lead and arsenic works, and among workmen in factories where lead and arsenic are used (especially in the manufacture of colours and in the weaving of silk goods). In addition to the wellknown general signs of poisoning these workmen develop typical neuritis, paralysis of muscles, accommodative and muscular asthenopia and disturbance in the reaction of the pupils. When complicated with albuminuria albuminuric retinitis has also been observed. In very rare cases hemianopia has been seen, and among workers with arsenic conjunctivitis also and its results.

The disease is so common that almost all countries have laws to prevent lead poisoning. They are all aimed at preventing the inhalation of lead particles or vapour, and try to prevent the skin from being soiled by materials containing lead, or at any rate to render them innocuous as soon as possible. A special dress, plenty of accommodation for washing and bathing, and rules forbidding eating and drinking in the workrooms are of the greatest importance.

In gutta-percha factories poisoning by carbon disulphide occurs and manifests itself as a neuritis; but the disease is not very common. The abuse of tobacco and alcohol predisposes to it. Poisoning may be prevented by adequate ventilation; if the disease occurs the occupation must be changed.

In the manufacture of aniline colours and of blasting materials, for example roburite, nitro-benzol is extensively used. Poisoning with this gives rise to neuritis in addition to general symptoms. The precautions required are similar to those for lead and arsenic poisoning. Aniline works produce disease similar to that caused by poisoning with nitro-benzol; symptoms of poisoning are especially apt to appear from dealing with aniline oil. In addition we find greyish yellow discolouration of the conjunctiva and cornea, and inflammation of these. Prophylaxis consists in adequate ventilation.

Workers with phosphorus who suffer from phosphorus necrosis may also have necrosis of the bones of the orbit,

retinal haemorrhages, and fatty degeneration of the retina. The prophylaxis is similar to that for lead poisoning.

Workers in tobacco factories get a neuritis as the result of nicotine poisoning. Workers employed in the manufacture of liqueurs in rare cases get disease of the optic nerve as the result of alcohol poisoning. Prophylaxis consists in adequate ventilation.

Accidents to the eye are naturally very frequent in trades, but differ very much according to the nature of the occupation. In some trades accidents to the eye are so rare that one can scarcely speak of the necessity of any protective measures; in others they are of almost daily occurrence, so that, as previously stated, we may almost regard such accidents as injuries peculiar to that trade.

The injuries through accidents which we have here to consider may be arranged in three groups: mechanical injuries, burns and injuries by caustics.

Mechanical injuries occur most frequently in the iron and steel industries. And next we find them in the metal, wood and stone industries, and in mining. Mechanical injuries are also fairly frequent in the building trade, though corrosion by lime is relatively more frequent as will be explained below. In the manufacture of mineral waters injuries are produced by the bursting of bottles and flying out of corks. In the metal, wood and stone industries the injury is in a very large majority of cases caused by foreign bodies, such as pieces of iron, steel sparks and splinters, splinters of other metal and of wood, and particles of stone. In quarry work and mining injuries are caused by blasting. The injuries are very different and vary from the simple penetration of a foreign body into the superficial layers of the conjunctiva and cornea, which heals and leaves no ill effects, to the total loss of the eye through penetration of large foreign bodies into the interior of the eye or the total disorganization of the eye by rupture caused by great force.

In weaving eye accidents are peculiarly common, because the shuttles are very apt to fly out of the shuttle box whenever they make more than fifty journeys a minute.

The danger of these wounds is not only that of the consequences of the wound itself, but there is also the danger that it may have been infected by the object which produced the injury, or that it may become infected afterwards by want of care, and thus lead to purulent infiltration serpiginous corneal ulcers, cyclitis and panophthalmitis.

This danger of infection, even of quite trivial wounds of the cornea, is very common in agricultural pursuits. In harvest work, binding and stacking hay and straw, and pruning hedges and trees, it is not rare to meet with small superficial abrasions of the corneal epithelium caused by dust or grain or husks which get into the eye, or by the direct contact of the eye with the straw or hay. These superficial wounds of the cornea may then become infected if the conjunctiva or lachrymal sac is in an unhealthy condition, or the objects which inflicted the wounds may themselves be the carriers of the infection, or the infection may be conveyed by wiping the eyes with the fingers which are soiled. The result is generally a serpiginous corneal ulcer, and it is so common among farm workers that the French call the disease harvesters' keratitis.

Moreover in gardening and forestry small corneal erosions are produced when branches or pointed leaves come into contact with the eye. It is characteristic of these that they heal quickly without leading to any infiltration, but later give rise to "recurrent corneal erosions."

Injuries by blunt instruments, especially by the horns of cattle, are also characteristic injuries in agricultural pursuits. Prophylaxis in all such injuries consists partly in the endeavour to prevent the injury altogether, and partly in the prevention of the consequences of the injury.

The injuries may be prevented by mechanical contrivances, applied either to the work place or to the eyes of the workman: protective shields or spectacles. Further details will be found at the end of this section. As a special contrivance we will instance the shuttle catcher of weaving looms. There are many such contrivances; Albrecht's is probably the best.

When in spite of all precautions an injury has been

sustained, the possibility of infection must be prevented. Wiping the eyes with the fingers or with handkerchiefs or aprons, which are mostly not clean, must be strictly forbidden; clean water or, better still, some disinfectant should be used to wash out the eye and the injured man should be quickly taken to the doctor. All this can only be attained by constant instruction, and very much good would be done by having rational hygiene a subject in the curriculum of elementary schools. The prophylactic measures to be adopted to prevent the secondary results of such injuries have already been given.

Injuries through burning are met with chiefly in the metal industries, and are caused by hot pieces of metal flying into the eyes; they may be caused also by blasting in quarries and in mining. Prophylaxis for the former will be described below, under protective contrivances; that for the latter is adequate care.

Corrosions are most frequently caused by lime or cement in the building trade, and in the chemical industries and in the manufacture of drugs they are caused by the spirting into the eye of corrosive or irritating substances and gases.

The prevention of these injuries will be described at the end of the section, among protective contrivances. In regard to the prevention of the results of any such injury prophylactic treatment is particularly important in the case of injury by lime.

Two methods of prophylactic treatment must be considered: washing out with oil and washing out with large quantities of clean water.

In using oil it is very important not merely to drop the oil into the eye, but by means of a syringe holding about 3 ounces to syringe out the eye fairly forcibly, while it is held open, and to remove as quickly as possible all particles of lime by means of a piece of wool dipped in oil. The oil is injected so that it will envelope the lime particles and prevent their further corrosive action, and at the same time the tissues are covered by a layer of oil and thus protected against being corroded. If there is no oil at hand the eye may be washed out with water. But it is of the utmost

importance that a large quantity of water should be poured in a constant stream over and into the eye, so that the lime or cement may be removed at once. If but little water is used the contrary effect will be produced; the corrosive material will dissolve and spread over the whole eye.

In injuries by caustic alkalies it is equally necessary to remove the substance as quickly as possible from the eye and to neutralize it. For this purpose a solution of acetate of lead is best, because it is a weak acid and will neutralize the alkali.

We have seen that injuries to the eye may be caused by splinters of all sorts which fly into the eye, by chips or sparks, cold, hot or glowing pieces of metal, drops of molten metal, hot slag, and spirting or corrosive fluids; also dust, smoke, certain vapours, fumes, gases and glaring light. There are two ways in which these injuries may be prevented: protective screens fixed to the machine itself and protective spectacles. The protective screens made of wire grating or glass, are so fixed that they catch the splinters or sparks or other substances which fly out. They are therefore useful only for occupations where the direction which will be taken by these flying pieces is known, as in grinding or weaving. In some cases the machine and work can be covered in with a glass case, so that the working can be seen and the splinters caught. If other workmen near are also endangered by pieces that fly off, it seems best to separate the workmen's benches one from another by protective partitions; such partitions, generally of wirework, are also required to protect passers-by; for example, in breaking stones in the road to protect passers-by from pieces which fly off. When these protective measures cannot be adopted the workmen should wear protective spectacles.

When we remember the serious injuries to the eye to which a workman may be exposed and which often cannot be remedied, one would think the workmen would gladly and gratefully avail themselves of such protection. But it must be acknowledged that a large number of workmen have a decided objection to wearing anything to protect the

eyes, and the endeavour to enforce the use of these spectacles may lead to open resistance and to strikes; and this happens notwithstanding the Prussian accident law of 1884, by which those who fail to carry out the precautions prescribed are punishable with fines up to six marks.

It must be confessed that this reluctance is not altogether unjustifiable, because masters, just to conform to the legal regulations, often supply spectacles which are cheap, but more or less useless for the work to be done.

The complaints of workmen are chiefly the following—

(1) That these compulsory spectacles, especially when provided with side pieces, limit the field of vision and make the wearer uncertain in his work; (2) they diminish the acuteness of vision; (3) that they often soon cause pain in the eyes, headache and giddiness; (4) that the glasses often get covered with steam and become misty; (5) that they produce a sensation of heat in the face and that perspiration readily accumulates behind them; (6) that the metal spectacle frames become so hot as to be uncomfortable; (7) that many spectacles are too heavy; and lastly (8) that even when one puts up with all this, the spectacles do not give the protection which was expected from them, and that the workman has all these discomforts very often without any good result.

These complaints show that many of the protective spectacles in use by workmen are not suitable.

In general we may say that the workman's spectacles should be as light as possible, the frame strong, and easy to fasten to the head; they should fit comfortably, give as large a field of vision as is possible, and in order that the eye may not become heated they should admit of free ventilation. If glasses are worn in the spectacles, they should be easy to clean and to change. If the work requires acute vision the spectacles must not restrict acuteness of vision; when glowing, hot or corrosive material has to be handled which might spirt out, that part of the spectacles which is in contact with the face must be

made of some bad conductor of heat, and sometimes the whole face and head will need to be protected.

Protective spectacles for use when working with hard materials demanding good vision must be made of glass. For work where pieces do not fly into the eye from the side, the ordinary shell shaped white glass is enough; but the glasses must be as large as possible, and sometimes two or three times as thick as the ordinary spectacle glass. A diameter of an inch and three quarters and a thickness of a sixth of an inch generally suffice.

When protection is required against particles which enter the eye from the sides as well as from the front, the frame must fit round the rim of the orbit. Most protective spectacles for this purpose are modifications of the drum shaped spectacle. Spectacles with pieces of mica and more recently spectacles made entirely of celluloid may be recommended. The frames of the spectacles are made of metal and are generally mounted upon leather or a soft material so that they may be more firmly fastened to the head and may exercise as little pressure as possible upon the face. The frame itself is perforated or made of wirework to allow of circulation of air.

For working at and for breaking up hard materials, when acute vision is not required, protective spectacles of wirework are used, hollowed out in front of the eyes and covered with leather or some soft material where they rest against the face.

When working with glowing, hot, or corrosive materials which may spirt out, and when working in rooms filled with dust or smoke, protective masks or hoods are best. by which the face and head are protected by wirework, or by pieces of glass or mica let into a hood made of suitable material; this should be made of asbestos when there is danger of fire. For work which does not require acute vision and in which the whole face and head have to be protected, as in the manufacture of mineral waters or other effervescing liquids, it is best to use a contrivance like a fencing mask.

It would take us too far to enter into the various forms

of the different protective screens and spectacles; their number is so great that Hartmann and Villaret's book on workmen's protective spectacles alone gives illustrations of seventy-one different kinds. It ought moreover not to be difficult to select according to the principles given above that form which is best adapted for the work.

For injuries of the eye which are not caused during work, but either from the thoughtless handling of dangerous instruments or as the result of criminal attacks, there is obviously no prophylaxis. Severe punishment for thoughtlessness and for criminal acts, and careful teaching and supervision of children are the only possible protective measures. We cannot emphasize too strongly the very great danger of playing wtth percussion caps, powder and fireworks, and the shooting of arrows and the throwing of stones. In regard to little children, the old proverb is true: "Messer, Gabel, Scher und Licht, taugen für kleine Kinder nicht." (Knives, forks, scissors and lights are not good for little children.)

Similarly there is no prophylaxis against poisons apart from occupation, except in the case of alcohol and tobacco, of botulism and fungus poisoning. Prophylaxis for alcohol and tobacco may be summed up in the word—moderation. Prophylaxis against botulism and moril poisoning is restricted to the caution not to eat food except it be free from suspicion. We must here confine ourselves to mentioning the eye symptoms of various poisons: exact knowledge of these symptoms may sometimes lead to a quicker recognition of the cause of the illness and be of prophylactic value in the wider sense, because it gives the physician an opportunity of eliminating the cause of the poisoning in case it is still at work.

All the poisons which are met with in trades may also occasionally be the cause of poisoning apart from trade. These have already been mentioned, and we shall therefore here merely speak of possibilities of poisoning which are not met with in trade.

If we find mydriasis with paralysis of accommodation we should think first of poisoning by a mydriatic or by

deadly nightshade. But these symptoms are also characteristic of snake bite, moril poisoning and above all of poisoning by decomposed meat. In meat poisoning this is accompanied by ptosis, muscular palsy and severe general symptoms with corneal affections similar to those described as the result of the typhoid state.

If we find small pupils with spasm of accommodation which can only be determined when the general condition of the patient admits of the reading test, we should think of poisoning by eserine or pilocarpine, or by a narcotic, especially morphine, opium or chloral.

Severe optic neuritis is characteristic of poisoning by alcohol and nicotine, but it may also be the result of a longer or shorter constant use of large quantities of quinine, and may appear in an acute form in poisoning by salicine, carbolic acid, iodoform, pomegranate root bark and filix mas. Poisoning with coal gas or carbonic oxide may also cause serious disease of the optic nerve, either alone or accompanied by paralysis of ocular muscles, disturbances in accommodation, disturbances in the reaction of the pupil and exophthalmos.

Chronic ergotism, pellagra and naphthalin poisoning lead to cataract. Coloured vision has been observed with various poisons, and may sometimes point to the cause of the poisoning and suggest the appropriate prophylaxis. Yellow vision is observed in poisoning by picric acid and chromic acid, and regularly in poisoning by santonine; it has also been observed in carbonic oxide poisoning. Red vision points to poisoning by mydriatics; violet vision to poisoning by fungi or Indian hemp.

3. Prophylaxis in Heredity

Prophylaxis in heredity for the prevention of eye diseases has not yet received the attention it deserves. Apart from certain diseases and functional disturbances, such as Leber's optic atrophy, colour blindness and predisposition to cataract which tend to be hereditary, the predisposition to myopia, high degrees of hypermetropia and astigmatism are decidedly hereditary; and that retinitis pigmentosa is frequently

(if not always, as was once thought) a consequence of marriage between relatives, is a fact known to all physicians.

The inheritance of eye disease may be divided into three groups—

1. Development of eye disease through heredity from parents whose eyes are healthy.
2. Inheritance of eye diseases from parents.
3. Inheritance of diseases which may lead to secondary eye disease.

To the first class belong those eye diseases, especially retinitis pigmentosa, which are caused by consanguinity in the parents; and also those eye diseases which arise through atavism, that is in which the tendency to the disease is present in the ancestor. A typical example of this kind of inheritance is when a grandfather is colour blind and his grandson inherits the colour blindness through a daughter who had normal colour vision. We have here to consider also different abnormalities in refraction and muscular abnormalities connected with them.

To the second class belong Leber's hereditary optic atrophy, the tendency to cataract, and directly inherited errors of refraction and muscular disorders with their consequences. To this class also belong anomalies of development, such as coloboma of the iris and choroid.

To the third group belong tuberculosis and syphilis specially.

Prophylaxis is almost an impossibility, because when at the present time among civilized races the question of marriage is considered, the state of the physical conformation of those who wish to marry is the last thing which is had regard to, save in so far as beauty of face and of bodily form are concerned. From the oculist's point of view marriage between blood relations should not be permitted, and very shortsighted people should marry those only who have normal sight or are hypermetropic; in short two persons who have each the same kind of refractive error should not marry one another. Individuals among whose ascendants there have been diseases such as Leber's hereditary optic

atrophy, very early cataract, or coloboma, should not marry. The same is true of consumptives and of those who have syphilis which has not been completely cured.

It is obvious that these are merely counsels of perfection which will probably never be carried out. But the physician should always, when opportunity arises, at least endeavour by teaching to make these conditions more familiar to the public than is at present the case.

4. Prophylaxis in Operations

The prophylaxis in operations on the eyelids, conjunctiva, ocular muscles, orbit and lachrymal sac, is that of a general surgical nature. Reference for this should therefore be made to the chapter on surgery.

It is otherwise with operations in which the eyeball is opened, because the very least infection will then in most cases not only render the result of the operation doubtful, but even endanger the whole eye. In these operations the utmost care must be taken that all possibility of infection is excluded with the same scrupulousness as is required in general surgery for laparotomies and intra-cranial operations.

It is extremely difficult to produce and maintain an aseptic operation field for these intra-ocular operations. On the one hand the delicate structure of the organ makes it impossible to treat it, as we should the skin, with strong antiseptics, soap, brush and alcohol. On the other hand its position exposed to the outer air, with a mucous membrane suitable for the deposit of germs and its communication with the nasal cavity, offer opportunities for infection.

The bactericidal properties of the lachrymal secretion give a certain amount of protection, but must not be overvalued, as has recently been the tendency among adherents to the open wound treatment. In ophthalmic surgery asepsis alone is insufficient and we need to avail ourselves of antisepsis, especially as a prophylactic. The first and most important prophylactic measure for intra-ocular operations is to cure carefully all disease, inflammatory or otherwise,

of the eyelids, conjunctiva and lachrymal organs, and all inflammatory disease of the skin of the face.

The mucous membrane of the nose and pharynx should also be considered.

If there is inflammation of the lachrymal sac the most rational proceeding is to extirpate the sac. The simple occlusion of the puncta lachrymalia, by ligature or cauterization, does not suffice, because these procedures cause wound surfaces which themselves afford another opportunity for the settlement of infective germs.

When all existing disease has been thoroughly cured, or if there was from the first no deviation from the normal, preparations may then be made for the operation.

Twenty-four hours before the time fixed for the operation the face should be washed with a solution of corrosive sublimate (1 in 5,000), or if there is an idiosyncrasy against corrosive sublimate, with a three per cent. boric acid solution. The eye should then be washed out with a similar solution and compresses of it applied to the eyes for several hours. The evening before the operation day a so-called "trial dressing" is put on. This consists of a piece of sterilized lint dipped into an antiseptic solution; a piece of sterilized wool is placed over this and the whole is secured by a sterilized bandage.

Next morning, if there is no trace of secretion on the lint or on the edges of the eyelids or inner angle of the eye, we may safely proceed with the operation; otherwise the operation must be delayed and the conjunctiva or eyelids be treated until the trial bandage shows that there is no longer any secretion. There is a further great advantage in this preparatory treatment, because we learn whether there is any intolerance of the skin towards a particular antiseptic or dressing; for instance any tendency to "bandage eczema."

Some physicians have expressed a fear lest such a prolonged period of preparation should act unfavourably upon the patient, because he is excited and made anxious by waiting for the operation; but my experience of many years has not shown this to be the case. On the contrary when

the patient sees that everything is being done to make the subsequent operation successful and to prevent any ill effects, he loses any over anxiety he may have felt as to the result and approaches the operation with greater confidence.

The slightly longer time taken up by the treatment need scarcely be considered compared with the importance of obtaining a successful result in every operation. Although a loss of two or three per cent. may not seem great in medical statistics, yet the loss falls very heavily upon the individuals in the case of eye diseases, and to reduce the losses by even one per cent. is a great gain.

I am well aware that this method of treatment is contrary to that adopted by most ophthalmic surgeons, especially by the believers in the open wound treatment. This is not the place for long theoretical explanations. I will merely remark that my clinical experience has fully confirmed the practicability of the method recommended; and clinical experience, not theoretical hypotheses, must decide in such cases. Since the year 1888, when I introduced the method just described because I had had the unfortunate experience to lose an eye after an operation for cataract, in which a slight chronic dacryocystitis had not been discovered—in spite of a careful examination—I have had among about 1,000 cases of extraction of the lens to lament only one primary loss of an eye, and that occurred in a man sixty-eight years of age, who in the night after the operation had an apoplectic fit with facial paralysis upon the side operated on and paralysis of the opposite half of the body; a case which I am therefore justified in excluding altogether from the statistics. The same is true about the second case of wound suppuration with which I have met during the last twelve years: here it was not a case of primary infection but of suppuration which appeared after three days of perfectly normal healing in extraction of a senile cataract without iridectomy, for during the night between the third and fourth days the wound opened and great prolapse of the iris occurred.

As I do not imagine that I operate better than the

majority of my colleagues, and as my after treatment does not differ from that of others who use the occlusive bandage, I think I am justified in attributing my better general results to the departure from the ordinary method which I made, and which has recently been proposed also by others—that is the preparatory prophylactic treatment above described.

It remains only to mention now the prophylaxis of the operation itself. Above all we must avoid operating in a bedroom or living room; the operation should be done in a room arranged in accordance with ordinary surgical principles. As an example I will describe the method of operation as carried out in the institution conducted by me. The patient having had a bath and put on clean linen is first put into a room next to the operation room, and called the preparation room, in which are also the sterilizers for the linen, bandages and instruments to be used for the operation. In this room the patient's face is again washed with corrosive sublimate soap, and sterilized gauze dipped in corrosive sublimate solution is fastened over the eye by a sterilized bandage. Before the sister in the operating room receives the patient she disinfects her hands thoroughly and puts on a sterilized overall which completely covers her dress.

The eye is then anaesthetized, still in the preparation room, by means of some sterile solution. I use cocaine or holocaine. The patient is then laid upon an operating table, and the upper part of the body and the head are placed on a sterilized linen sheet. The upper part of the body is then covered with a large sterilized cloth reaching up to the chin, and a gauze mask is placed over the face with two slits in it for the eyes. These gauze masks have previously been for some days in a corrosive sublimate solution of 1 in 1,000.

The operator and assistants are dressed in sterilized overalls.

Instruments, even cutting instruments, are placed in wire baskets and boiled in soda solution. I have never found that they are wanting in sharpness if the same instrument is not used too often. They are then placed

in these wire baskets on a table covered with a glass top which has previously been washed with a strong corrosive sublimate solution. The table is placed beside the operator, and the instruments are covered over till the moment of the operation with a sterilized cloth.

When the patient is in position, that part around the eye which is not covered by the gauze mask is again washed with a solution of corrosive sublimate (1 in 5,000), the eye is washed out with sterilized normal saline solution and the operation is commenced.

At the operation we must see that the instruments do not pass through two hands except when rapidity of operating makes it absolutely necessary. Otherwise the operator should himself take every instrument out of the wire basket.

It is hardly necessary to mention that in changing the bandages asepsis must be strictly carried out and that the patient must not be put into a room in which there is anyone with an infective disease.

(c) *Prophylaxis at Different Periods of Life*

After what has been said in the previous chapters about general prophylaxis and the prophylaxis of the different diseases, it would appear at first sight superfluous to consider now the prophylaxis for the various periods of life. It is obvious also that in this chapter nothing will be said that has not already been said in the previous chapters. But, proceeding from the same point of view as in the last chapter, that this present work is intended for quick reference for the practising physician, it does not seem undesirable to make it possible for the reader to get a rapid idea of the prophylactic measures upon which the greatest stress is to be laid at the different periods of life. For although all that has been said applies upon the whole to every period of life, yet every part has not the same degree of importance for each period of life.

Efforts to prevent disease should, as appears from the prophylaxis of heredity, begin even before the individual is conceived or born. But as this period is not included in the scope of this present chapter it may be passed over.

But from the moment of birth prophylaxis for the different periods of life begins. As we saw in the chapter on conjunctivitis neonatorum, the first danger threatens the young child when it is passing through the genital passages, because the first danger which threatens the eyes of the newborn child is infection with pathological vaginal secretions while the head passes through the vagina. The necessary prophylactic measures will be found on page 666.

When the child has been protected from the conjunctivitis the second question that arises is its relation to light. Shall the eyes of the young child be protected from the light or shall they be exposed to the light regardless of precautions?

The one method would be as wrong as the other. The eyes of the newborn child seek the light of day to teach them to work, and we should therefore avoid surrounding the cradle with thick curtains or covering the windows as over anxious people are apt to do. Daylight is as great a need for the young eyes as is pure air for the young lungs. But this does not mean that the eyes of the young child are to be directly exposed to artificial light or even to sunlight. That too would be wrong. For on the one hand the reflexes against light are extraordinarily defective during the first weeks of life, and on the other hand the protective organs are so thin that they do not fulfil their object effectually. Moreover the eyes of the newborn infant are very deficient in pigment, and one of the best protections against dazzling is therefore lacking in early life.

We should then protect the eyes against glaring light, but allow the eye full access to diffuse daylight in a mild form. This is a very important prophylactic measure. For while on the one hand an anxious exclusion of light tends to delay the quick development of the functional use of the eye, the direct effect of glaring light on the other hand, especially of sunlight, may cause permanent injury by reducing the sensitiveness of the retina. I am firmly convinced that many an apparently congenital nystagmus has been caused by dazzling effects in the young child.

The way in which children are taken out in the open air also needs consideration.

A perambulator with a movable cover which, according to the position of the sun, can cover the front or back of the perambulator, is to be recommended for this purpose.

Moreover the infant should not be protected from the dust by very thick veils.

The remaining prophylactic measures for the young child correspond exactly with general prophylactic measures, and will not here be further mentioned. We shall merely state that in bathing the child the same sponge should not be used for the eyes which was used for other parts of the body. This ought to be self evident, yet the general practitioner has even more opportunities than the ophthalmic surgeon for knowing that this is not self evident to many mothers.

While the young child's eyes have only to be protected against organic disease and dazzling, the dangers which threaten the eyes become more numerous in childhood. In addition to the dangers with which the eye is threatened by disease, other dangers arise in even greater number from the use of the eyes. The dangers which principally arise from disease are those caused by general diseases; prophylaxis must therefore be directed chiefly towards the prevention of general disease, and reference to this should be made under the various sections in the chapter of prophylaxis in disease and functional disturbances arising from general disease. Special attention should be given to the chapter on the prophylaxis of scrofulous disease.

As regards the use of the eyes the following prophylactic measures should be noted—

During the first years of life the eyes should be gradually more and more prepared for the great demand which will be made upon their endurance during school life. The child's chief exercise is play, and its future depends very much more upon this play than is generally imagined. The child's arms are short, and when it wants to look at anything it therefore involuntarily brings the object near its face. Moreover the child's eye is not accustomed to work at small retinal images; it seeks so far as possible to obtain large images and the tendency to bring the object close to the eyes is thereby increased. This approximation

of the object is injurious, for the reasons stated under functional prophylaxis (see page 649), particularly when the eye is markedly hypermetropic or has a tendency to progressive myopia. It is therefore better not to give small objects such as small pictures to such children. It is better to give them a box of bricks for building, a ball and such things which do not require to be very closely looked at and with which moreover they can play out of doors. The unavoidable picture books should contain only well defined objects and above all should be properly coloured. This is the right time for learning to distinguish by name colours and their various tints. It is well too not to give the child too many picture books at a time, but rather to give him one and not give him another until he knows the first one thoroughly. The child is apt very readily to acquire a habit of superficiality in seeing which is very difficult to overcome later. Observation should be learnt when the child learns to see. It is often useful too to let the child say how large this or that object is ; in this way it learns to estimate by the eye. We must warn against too early learning to read and to write because this strains the eye unnecessarily before the fifth or six year.

Special caution is required against the growing evil custom in kindergartens of developing the child's sense of form at this early age by fine plaiting work or even by stitching perforated cards and trellis work. One must strongly caution against such work, especially for children whose parents have some refractive error or myopia.

When the child reaches school age the dangers which threaten its eyes are naturally increased.

There are two chief factors which are injurious, namely infection by aggregation with other children who have eye disease and near work. In regard to the first point refer to pages 663, 667 and 669.

As regards the second point prophylaxis against the ill effects of near work is essentially a struggle against one form of disease—the struggle against short sight. Although hypermetropic and astigmatic eyes may cause trouble and give rise to direct symptoms of disease, a systematic pro-

phylaxis is not so necessary for them. The trouble which such eyes cause the patient in doing near work will by itself quickly suggest the necessity for medical aid and the necessary prophylaxis—correct spectacles.

We should always bear in mind that a hypermetropic and an astigmatic eye are merely abnormal eyes, but that a myopic eye is a diseased eye.

Myopia however is generally only recognized when it is too late; and in a large majority of cases myopia is an acquired disease.

Although a few ophthalmic surgeons have recently expressed a contrary opinion, yet they cannot get rid of the fact established by the examination of the eyes of hundreds of thousands of school children, that the cause of myopia is near work and that schools make children myopic. Facts such as those for example given in Seggel's statistics cannot be got rid of by theoretical views. Seggel examined 1,600 soldiers in the Munich garrison, and found—

1. That among the peasants 2 per cent. were short-sighted.

2. That among day labourers and town dwellers 4 per cent.

3. Among artisans and those engaged in trades 9 per cent.

4. Among merchants, writers and compositors 44 per cent.

5. Among those who had completed their studies at public schools 65 per cent. had myopia.

In regard to prophylactic measures needed, reference should be made to the subject of myopia (page 685), to the question of illumination (page 652), and to the amount and kind of work (page 656).

When the age of twenty has been reached and manhood entered upon there is no longer danger in near work, except for a comparatively small number of people whose myopia tends to progress even after that age is attained. Such people must all their life be very careful about near work, but others may work with greater safety. Nothing more is then required beyond the correction of any error of refraction and care that the illumination is good.

A more careful prophylaxis is needed again when the period of presbyopia approaches. Convex glasses should then be early adopted, because if delayed too long it may sometimes lead to accommodative asthenopic troubles, ciliary neuralgia, and, according to Professor Schön, even to cataract and glaucoma. When disturbances of vision, even of trivial nature, begin at any age over forty years, we think more of the possibility of commencing cataract or threatening glaucoma than among younger patients. Nor must we forget that advancing years will expose the eye more to eye disease which results from arteriosclerosis and other diseases of the circulation.

In females there are the additional dangers of puberty and later of pregnancy, and of the puerperium and finally of the climacteric. Further details will be found in the chapter on prophylaxis in disturbances of the genital apparatus.

LEDS & WEST ROOM
OTOLOGICAL SOCIETY

The Prevention of Disease of the Ear

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737

The Prevention of Disease of the Ear

I. General Prophylaxis

In textbooks upon diseases of the ear, there are very few, if any, direct statements concerning prophylaxis against diseases of the organ of hearing, because these textbooks have to do with disease already existing; but indirectly much may probably be inferred as to prophylaxis from the aetiological factors given in these books.

A detailed account of this prophylaxis would appear to be the more needed because the anatomical relations of the organ of hearing do not tend specially to bring about recovery when that organ is diseased, but rather tend to prevent a cure, even when treatment has been employed. A further reason for prophylaxis is because the happiness and position in life of the patient may be much influenced by disturbances of the function of the ear, and lastly because the life of the patient may be endangered if the inflammatory suppurative process extend to the neighbouring structures, namely the base of the brain, the lateral sinus, the jugular vein or the carotid artery.

Tröltsch truly says that there is no other cavity in the whole body which is placed in direct contact with so many important structures as is the tympanic cavity—and this is saying so far as prophylaxis is concerned, "caveant ne quid detrimenti . . . . capiat."

The organ of hearing forms no exception, and its constituent parts may become diseased in the same way as any other organ or part of the body, not only primarily, but still more often secondarily by the extension of disease from elsewhere. For example, eczema of the skin

of the external ear may be primary; often however it extends to the ear by extension from the scalp or face; or again, especially in children with a delicate skin, it may be caused by irritating discharge from the middle ear. Similarly, catarrh and inflammation of the naso-pharyngeal mucous membrane may extend to the ear along the Eustachian tube; and on the other hand the mucous membrane of the tympanic cavity may be the so-called *locus minoris resistentiae* and be the site of a primary catarrh or inflammation. Here we have to consider not only the morbid structural changes in themselves but also the disturbance in the function of the organ which may result from them.

Obviously in this work we shall only describe those diseases whose cause or predisposing or exciting factors are known; those affections whose development and progress cannot as yet be hindered or checked in the sense of bringing them to a stand still or causing their retrogression, such as exostoses in the auditory passage, belong to pathology, and in so far as they cause functional or other disorders require to be therapeutically treated.

In general a hygienic life is a great protection against diseases of the ear. The ear should in my opinion be left alone as much as possible, and directly anything abnormal is perceived the surgeon should be consulted. There are people who imagine that the external auditory canal needs attention every time they make their often exaggerated toilet—that it must be kept absolutely clean and cannot be sufficiently cleaned even with an earspoon, a sponge, a hair pin, or a twisted corner of the towel. This seems to me injurious rather than otherwise and the ear should be let alone. Dirt should certainly not be allowed to lodge on the auricle itself. This can be best cleaned with the fingers, soap and water; the finger gets most easily into the recesses of the ear pinna and the auditory canal will only be included so far as the index finger can reach. Cerumen which is deeper than that is best left until it has made its way forward to the outer opening of the canal and can then be easily removed.

It is quite unnecessary to stop up the ear with wool when the ear is not inflamed, and it is only—as we shall see later—indicated under certain conditions. The tranquil layer of air in the auditory canal acts as a bad conductor of heat and protects the tympanic membrane from the external (low) temperature, and, generally, too, prevents water from completely entering the ear when the head is quickly dipped under water as in diving. Even the swimmer in the dorsal position need never let the head sink so low into the water that water gets into the ear; for this not rarely causes giddiness.

The commonest and most important ear diseases are those affecting the middle ear, and these mostly extend into the ear from the naso-pharynx by way of the Eustachian tube. Hence, we should whenever possible avoid all causes and occasions which we know from experience may produce affections of the naso-pharyngeal mucous membranes, or we should by early treatment endeavour entirely to prevent their extension to the ear, or, at least, reduce their severity.

Where these acute affections are ushered in by subjective symptoms which make themselves felt, patients of the better classes generally soon seek medical advice; the lower classes are unfortunately more indifferent to such symptoms or may first try some homely remedy, such as a warm compress on the ear, or the application of steam or the vapour of camomile or of mallow tea to the auditory canal, the head being wrapped up in a large cloth, and several thick layers of material covering the ear with the view of avoiding draughts. Generally I feel uneasy when I see a patient come thus—the slight alleviation of the pain obtained by this means is mostly at the expense of great softening of the tissues, profuse suppuration and extension of the inflammation. These patients are so weakened and reduced by it, that one has to examine them very quickly and carefully in order to obviate an attack of syncope. Still greater and more serious is the indifference shown in chronic purulent inflammation of the middle ear. Many factors combine to bring about this indifference: ignorance of

the importance of the disease, the superstition that harmful "humours" are eliminated from the body by the otorrhoea, the consolation of oldfashioned doctors that the otorrhoea will cease when puberty approaches, the fear of treatment, the refractoriness of children. There is often also the want of time and opportunity for treatment, especially in the country where people do not go to the surgeon till polypi as large as cherries or pigeon's eggs have grown from the auditory canal—and sometimes, in Germany, the prospect of being freed from military service.

And when a patient with ear disease comes under treatment for meningitis or pyaemia resulting from neglect of the ear trouble, and cannot then be saved, the right lesson is not even then drawn from the facts, but on the contrary it is thought—the patient lived a long time unhurt by his ear disease, and now that he puts himself under treatment he is getting worse. And thus many a man who has tried to escape military service through his neglected otorrhoea has died sooner than he otherwise would. I have seen, too, a young woman carried off by otorrhoeal meningitis after a few weeks of married life. Such tragic events cry aloud for prophylaxis and prophylactic teaching.

Fortunately the matter is not always so serious. Severe pain in the ear is often complained of; examination of the auditory meatus shows that there is no inflammatory change there, but we may find a carious molar tooth in the lower jaw, the pain being referred to the ear, and often so markedly that the patient seriously protests against the opinion of the aural surgeon that it is due to the dental caries. We would here therefore point out the need for attention to the teeth and their occasional examination and treatment by a dentist.

General hygienic measures will also prevent infection by tuberculosis and syphilis. Tuberculosis often attacks the structure of the tympanic cavity, the tympanic membrane, and the skin and cartilage of the auditory canal. Syphilis may in addition attack the nervous apparatus of hearing and cause complete deafness.

Prophylaxis against disease of the external, middle and

internal ear will be given; but we shall not be going beyond our task if here and there we add hints to prevent acute disease from developing into chronic disease, with all the serious consequences to the life and hearing of the patient which may result therefrom.

II. Special Prophylaxis

PROPHYLAXIS AGAINST EAR DISEASE IN CHILDREN DURING THE FIRST YEARS OF LIFE

Attention should be given to the ears of children even in the first year of life, and eczema intertrigo should be prevented by carefully drying the skin behind the ear, by using powder and by separation of the contiguous surfaces.

In regard to the pinna of the ear it should be noted that if it is pressed too much against the side of the head by tight-fitting hoods, the cartilaginous posterior wall of the auditory canal is thereby pressed forwards and the lumen of the auditory canal narrowed to a slit. This narrowing allows the cerumen to accumulate easily and frequently and disturbs hearing, and when there is disease in the remoter parts of the auditory passage it may be a great hindrance to treatment. On the other hand caps should not come down so low over the head or be pressed down so as to push the upper part of the pinna forwards and downwards. The thinness of the pinna and the great extent of surface make it very susceptible to frost bite, and it should therefore be protected against this. The power of fashion and the vanity of women are far too great to permit us to hope that the custom which has descended from a barbarous age of piercing the lobule of girls' ears for earrings will soon disappear, however greatly it may be desired to prevent the ill effects often observed: these are infection, obstinate eczema, ulceration and loss of substance of the lobule, tearing out of the ring from the hole and splitting of the lobule, frequent inflammation with formation of abscess, development of keloid and fibromata. Moreover, it is very

unsightly when the lobule is pulled down by the weight of heavy earrings, and the hole becomes an ugly slit.

The tympanic cavity of the newborn child is still filled with foetal structures which soon become absorbed: this causes a certain irritable condition of the tympanic mucous membrane; moreover the Eustachian tube in the child is shorter and wider than in the adult. These factors produce a somewhat greater predisposition to involvement of the middle ear when there is any affection of the naso-pharyngeal mucous membrane. This must if possible be prevented by care in bathing the child and in taking it out of doors.

In consequence of the communications between the tympanic cavity and the cerebral meninges through the connective tissue in the wide petro-squamosal fissure, acute inflammation of the middle ear in children is often accompanied by cerebral symptoms; and when there are such symptoms the ears should always be examined, as Tröltsch points out, especially when there is no sufficient cause to be found in other organs.

The mastoid antrum and tympanic cavity form almost one continuous cavity in the child's temporal bone, and the antrum becomes therefore much involved in any inflammation of the tympanic cavity and great attention should be given to the mastoid region. Inflammation of the soft tissues over the mastoid and fluctuation are indications for early incision or opening up of the mastoid process to prevent necrosis. For the otorrhoea the insufflation of boracic acid is less useful in children than in adults because the narrowness of the auditory canal makes the application difficult; the dropping in of astringents is more suitable and gives better results.

It is very important to test early the child's power of hearing and to make sure that it reacts to sound, and if there is any doubt about it to have the ears carefully examined. It may happen that some latent disorder, such as catarrh in the middle ear, may more or less prevent the conduction of sound to the labyrinth, and that the nerve apparatus for hearing will thereby be retarded in its functional development, a want which, if early enough recog-

nized, may be removed by suitable treatment, but if untreated may lead to further loss of hearing power. These children do not learn to speak till late and then indistinctly, and in severe cases may almost resemble deaf mutes. There may in these cases be some mental weakness or idiocy (psychical deafness), and we must determine how far inability to hear is a cause of the symptoms.

Still more urgent is the early and repeated examination by a surgeon of children who belong to families in which so-called nervous deafness or difficulty of hearing occurs, or who come from marriages between blood relations, and about whose power of hearing there is some doubt; because here too the cause is often some defective development and we can hope for a better result if the proper treatment is commenced early.

PROPHYLAXIS AGAINST AFFECTIONS OF THE EXTERNAL EAR

It was probably less the slight painfulness of a pull on the pinna than the ease with which it can be reached and laid hold of, which in earlier times, and often even now, induced many, especially masters and workmen, to take their subordinates "by the ear." The ear should, however, never be pulled forcibly; laceration, fracture of the cartilage or haematoma, if there is a predisposition to it, may be the results. It may be serious for the ear, and even for the life of the patient, if a foreign body lodge in the auditory passage, whether it got in through play, intentionally, or by some accident. With the exception of molten iron, lead and boiling corrosive fluids, the mischief is scarcely ever caused by the foreign body itself, which may often remain in the ear for years without producing any disorder, but by the unsuccessful attempts at extracting the body which are made by unskilled hands. These rough attempts may produce excoriations of the walls of the auditory canal with otitis externa, the formation of granulations and polypi, rupture of the tmypanic membrane and fracture of the auditory ossicles, otitis media, inflammation of the labyrinth and meningitis.

Many a young life has been sacrificed in the attempt to remove a seed harmless in itself.

Whether in children the warning not to put foreign bodies into the ears acts as a suggestion to do it must be decided by the teacher.

In whatever way a foreign body may have entered the auditory canal, for unskilled hands it is much better left untouched. The surgeon who is versed in ear disease will first convince himself that there is a foreign body present by examining the ear with the aid of a mirror, because often a search has been blindly made for a foreign body which was not there. If it is necessary to introduce a speculum, this as well as all other instruments that are used should be cleansed in strict accordance with the requirements of asepsis. The speculum must be inserted carefully and not far, in order that the foreign body may not be pushed in farther, and without further examination with the probe the surgeon directs a stream of water with a syringe and washes away the foreign body by this harmless method. But if wrong manipulations have already pushed the foreign body deeper, and it is wedged in, one must not hesitate to get expert help. Often it is still possible to remove the foreign body by repeated syringing, aided perhaps by slight anaesthesia and the cautious use of a suitable hook, and when this is not possible treatment is indicated for the commencing inflammation, so that the swelling may be removed, the auditory canal be widened and the foreign body previously impacted be thus set free. If inflammation of the middle ear and suppuration have set in, dangerous extension of the inflammation to neighbouring parts must be prevented and operative interference should not be delayed, particularly when the foreign body hinders the free discharge of the pus. In connexion with this subject, we must try to remove the custom which is so common among the lower classes of putting things into the ear when they have toothache, such as garlic or camphor; they probably do not remove the reflex pain, and if the patient is anxious about the foreign body and unable himself to get it out, he often falls into the hands of

officious persons and may be injured. It has also happened that a man suffering from toothache has taken a piece of wool soaked in creosote to put into the hollow tooth, and has by mistake put it into the ear and caused serious corrosion and ulceration. The "pure almond oil," which is so often dropped into the ears of children when they complain of pain, does more harm than good, because it lets time go by which should be used for rational treatment. This is still more true about those much praised ear-oils and balsams which often set up irritation, provide a suitable soil for fungi and produce parasitic otitis externa.

Under ordinary conditions it is as a rule not necessary to put cotton wool into the ear; indeed it is better not to do so because the loose fibres of the wool remain behind, cause itching and irritation, and with the wax form firm masses in the ear.

There are people who are in the habit of putting cotton wool into the ear. They often forget they have already put in a piece, or, thinking it has fallen out, they put in a second and later a third piece into the ear, so that the first piece is pushed further and remains there till, encrusted with cerumen, it acts as a foreign body, producing deafness and noises in the ear and making the patient seek for help.

Much more harmful is the habit of putting things into the ear such as earscoops, sponges, matches, toothpicks, hairpins, needles and knitting needles, penholders and pencils, whether to clean out the ear or to scratch it. The mere touching of the deeper parts of the posterior wall of the auditory passage produces a reflex sensation of tickling in the throat and coughing, a plain hint that it should not be done.

Such manipulations, often practised from bad habit or thoughtlessly, may have very unpleasant consequences. For example a piece may be broken off or loosened from a match, a toothpick, or a pin with a glass or bone head, or pencils with bone or metal tops; and it has often happened that when the object has broken, the top, or a piece of it, has remained in the ear as a foreign body. Moreover, any

cerumen which is in the ear will be pushed in further by these instruments, and the passion for scraping the walls of the meatus may easily cause eczema, excoriations and otitis externa. But there is also the danger that this manipulation may rupture the tympanic membrane and suddenly plunge the stapes deeply into the foramen ovale, which generally produces momentary unconsciousness, giddiness, noises in the ear and deafness, and sometimes suppurative otitis media.

By avoiding these manipulations or scratching the auditory canal with the finger nail we shall at least not be assisting the development of otitis externa. But if from some other cause this is already present, early treatment is required to check the extension of the inflammation, and the patient should not discontinue treatment until the physician has examined the ear to see that the disease has quite healed. For it is possible that the granulation tissue remains and keeps up suppuration, though the patient is not aware of anything except that the "ear wax" has altered and is soft, greenish yellow, and has an offensive smell. This is inspissated pus which proceeds from the granulations and covers them.

The prophylaxis of diffuse otitis externa will be given later under otitis media, in the course of which it generally appears.

Eczema of the external ear, though in itself a trivial skin affection, must not be treated lightly or neglected. The fissures often produced by it, especially in the incisura intertragica, are not seldom the starting point of erysipelas, and chronic eczema may lead to considerable thickening of the skin of the meatus and of the auricle.

THE PROPHYLAXIS OF DISEASE OF THE TYMPANIC MEMBRANE

The tympanic membrane is protected in general from disease and direct injury by reason of its deep position at the inner end of the auditory passage. Primary inflammation is indeed rarely met with, and then only in individuals

with an exposed broad and short auditory canal, when the tympanic membrane is struck by a current of cold air or cold water. In regard to this an exception may be made to the rule of not stopping the ears with cotton wool, for in these cases it is sometimes a wise precaution to use a plug of wool in the ear when dipping the head under water or driving in an open carriage, on board ship when a keen cold wind is blowing into the ear, or when the auditory canal is wet after having been syringed and after bathing. Direct injury and rupture of the tympanic membrane may be prevented by avoiding the cause, namely scratching the auditory canal with pointed objects such as toothpicks or knitting needles. Nevertheless, it has happened to many that in a thick undergrowth a twig has got into the ear and has penetrated the tympanic membrane. It may also easily happen when one lies on the grass or on straw or hay that a blade gets into the ear and pierces the tympanic membrane.

On the other hand the tympanic membrane may be indirectly injured by being ruptured when exposed to any sudden condensation of air in the auditory canal, by a blow on the ear, by diving into the water and by sudden rarefaction of the air from kissing the ear near the external auditory meatus. In raising the pressure of the air by blowing through the Eustachian tube (Politzer's method) and in rarefying the air in the auditory canal care must be exercised, because an atrophied and scarred tympanic membrane may easily be torn. For the former the air bulb must only be gently compressed and the patient told at the same time to press the finger well into the auditory canal in order to some extent to exercise a counter pressure ; for the latter we must employ very slight rarefaction only.

But in all cases of rupture of the tympanic membrane where the hole gapes open one should simply close the auditory canal with a piece of sublimate gauze and await events. In order that secondary inflammation of the middle ear may be prevented no drops should be put into the ear, and it should not be syringed unless it is unavoidable. When a more careful inspection and description are necessary for giving a certificate, one must carefully so far as is

possible remove flakes of epithelium and cerumen with forceps and wool.

When patients believe that the ruptured tympanic membrane cannot heal without some application, and it is feared that for that reason, or with a view to claiming higher damages for the injury, they will make use of something which might cause consecutive otitis media, then it is best to prescribe some simple ointment to rub round the ear and to put on a protective bandage. Even a commencing consecutive inflammation may be checked by suitable treatment and by not irritating the parts by putting in drops. Most ruptures of the tympanic membrane may be regarded as injuries of very slight severity.

Not only must we prevent rupture whenever possible, but we must also prevent everything which may lead to relaxation of the tympanic membrane or tension of it wherever there is a tendency to it as the result of some previous pathological process, as frequent forcible blowing of the nose, the abuse of Valsalva's method by the patient to improve his hearing, too long continued treatment by catheterization, and too vigorous so-called massage of the tympanic membrane by compression and rarefaction of the air in the external auditory meatus. It is especially the posterior superior quadrant of the tympanic membrane that is most affected by increased pressure in the middle ear and is finally bulged out in the form of a pouch, an overhanging sac, or the finger of a glove turned inside out. When the pressure diminishes the relaxed part falls back just as deeply towards the tympanic cavity, and lies against the incus or head of the stapes, and by pressure upon the head of the stapes gives rise to subjective noises and disturbances of hearing. Relaxed scar tissue may become so loose that it moves with any slight variations of air pressure in the tympanum, such as occur in breathing and in swallowing, and may cause the patient much discomfort.

PROPHYLAXIS AGAINST AFFECTIONS OF THE MIDDLE EAR

The prophylaxis against diseases of the middle ear is, so far as catarrh and suppurative otitis media are concerned,

identical in general with the prophylaxis against those diseases in which the ear becomes affected by extension of inflammation, as in the various affections of the mucous membrane of the respiratory tract, and the acute infective diseases, scarlet fever, measles, smallpox and diphtheria, and we may therefore refer the reader to the sections dealing with these diseases. And yet we cannot avoid mentioning here that which specially applies to the ear.

Catarrh and suppurative otitis media seem clinically in their typical form and severity to be different diseases; yet between these two main types there are a number of other stages, transition forms. We do not yet know definitely why in one case the effect of the virus should cause catarrh, and in another case suppurative otitis media; indeed the disease may commence as an acute otitis and then becoming less intense run its further course as a catarrh, or vice versa. Doubtless this depends upon the intensity and duration of the action of the virus, the number and virulence of the micro-organisms and the power of reaction of the organism. Prophylactic measures must be directed against both these forms. With children, especially fair children with a delicate complexion, one must begin to fight against the predisposition which most of them have to catarrhal disease of the respiratory tract by hardening the body and attending to the general bodily health. Daily a short cold rubbing down of at least the upper part of the body and arms, brisk movements in the fresh air, though not in very wet cold weather, fog or mist. Swimming, gymnastics, and brine and sea baths, according to the season, are of value. The clothes should not be too heavy or too warm. The feet should be kept dry and warm, and sudden changes of temperature should be avoided. When necessary, iron, cod-liver oil and appropriate mineral waters may be administered. These are the ordinary measures to be adopted. Moreover it is necessary to warn against sitting too long out of doors in gardens or places of amusement when the ground is damp, as in spring and autumn, or in the cool evening air after sunset.

Hypertrophy of the tonsils, adenoid growths, abnormal

conditions of the nasal passages, such as deviation of the septum, or polypi which obstruct the free entry of air into the naso-pharyngeal space and necessitate respiration through the open mouth, are further causes for frequent attacks of sore throat and of catarrh of the tonsils, throat and middle ear. Removal of the tonsils and of the adenoid growths is therefore to be recommended, especially where there is excessive growth of these structures. When there is only moderate hypertrophy we may rely upon medical treatment and the prospect of spontaneous retrogression of this lymphoid tissue. Palliative treatment of the catarrh of the middle ear by blowing in air may also be employed.

When there is acute naso-pharyngeal catarrh its extension to the middle ear should be if possible prevented by keeping the patient at home in a moderately warm room, by the use of gargles and the insufflation of boric acid powder. Violent blowing of the nose, whereby the alae are pressed against the septum and then forced open by the expulsion of air from the pharynx—as is so often done—should be avoided, because infective matter is possibly thereby driven into the middle ear and passive hyperaemia also set up. The nose should be blown in such a way that first one ala is pressed against the septum to close the naris while the air is expelled through the other open naris, and the same process then gone through on the other side.

Patients who do not consult the physician for an acute nasal catarrh or pharyngeal inflammation, wait to allow their middle ear catarrh to heal naturally. But the anatomical relations of the ear are not very favourable to healing: rather do the catarrhal changes in the ear tend to persist. Frequent attacks, whose course may be still further protracted by the hypertrophy of the tonsils and adenoids above mentioned, are mostly the cause of chronic middle ear catarrh, and early appropriate treatment is therefore required for middle ear catarrh and naso-pharyngeal affections. In regard to the latter certain precautions are necessary; thus for example if Weber's nasal douche is to be used high pressure should be avoided so that no fluid shall get into the middle ear. It is even better to wash out

the nose with a syringe. The reaction caused by a vigorous use of the galvano-cautery, especially near the seat of the pharyngeal opening of the Eustachian tube, or by examination, or by a posterior nasal plug, may extend to the middle ear and produce catarrh or otitis media. Another source of injury which may extend to the middle ear from the naso-pharyngeal mucous membrane is the abuse of tobacco (especially cigarettes) and snuff taking; the latter custom is no longer so common as formerly, and is adopted only by certain classes and trades.

We must not here omit to mention the importance of the appointment of school physicians, so that the ears of school children may be examined. Middle ear catarrh, especially so-called tubal catarrh which runs a more latent course, has to be considered. While middle ear inflammation soon reveals its presence by otorrhoea, this on the other hand gives a feeling of obstruction in the ear and of subjective noises to which less attention is paid, and when these children fail to hear many things and often ask questions, it is at first ascribed at home and at school to inattention and distraction. The child is backward in its work at school, and finally the parents begin to think that the child's hearing must be bad, or the teacher asks that the child may be seen by a surgeon. But often a whole school year is thus wasted, and this would be prevented if the children were examined by school physicians at the beginning of the term or from time to time.

If as stated above it is necessary to prevent catarrh of the naso-pharynx from extending to the ear, this is still more necessary in the case of severe inflammatory processes in the naso-pharynx which may set up suppurative otitis media, a very serious disease which may even endanger life. The remarks made above are applicable also here.

In order that an acute inflammation of the middle ear may run a favourable course without any complications it must from the very beginning be treated properly, and it appears therefore desirable to examine the ears from time to time during the course of acute infectious diseases in which the naso-pharyngeal mucous membrane is affected

to see whether there is any commencing involvement of the middle ear, and thus avoid being surprised later by an otitis which has spread to the mastoid or by an otorrhoea.

If the otitis media has already commenced, with violent pain in the ear, I consider it best, in order to prevent complications, to treat it with sedative measures and to avoid any further irritation. Cold is first to be applied by cold compresses or Leiter's tubes round the ear, chiefly to the mastoid, to subdue the inflammation and prevent its further progress. But as before stated the cold must be applied from the very commencement of the inflammation, although there be as yet no tenderness over the mastoid process or pain in it. The cold is applied rather to prevent inflammation, and it is generally too late to begin the application of cold when the inflammation in the mastoid cavity is already marked and causes pain. The treatment must be aided by suitable diet, rest, avoidance of bodily exertion, and of stimulating food and drink, and by regulation of the bowels.

Among sources of irritation to be avoided are the application of steam by a funnel in the ear which is still much used by some people, and the application of hot poultices to the ear: both rather favour the spread of the inflammatory process and suppuration.

There is a growing opinion now that it is best to avoid the use of narcotic liquids in the ear, because their analgesic effect is but slight and they tend to produce maceration of the cutis of the auditory canal and tympanic membrane, and because—may I add—one is apt to think enough has been done when this has been prescribed, and the most important part of the treatment is neglected. It is difficult to avoid the thought that this is the reason that acute otitis media is accompanied by such serious complications threatening life and necessitating operative interference. The pain may be relieved in other ways, as by using narcotics in the form of ointment round the ear or internally to ensure a night's rest, and moreover the pain is best removed by the application of cold. Treatment by cold and the avoidance of all direct irritation are the chief measures until the inflammatory process has commenced to subside;

the auditory canal should be lightly stopped with wool or sublimate gauze and nothing be dropped into the ear.

By this treatment the inflammation often passes off in a few days without leading to perforation or otorrhoea, a course which compared with those cases in which a long lasting otorrhoea occurs may be termed abortive. Paracentesis is generally indicated only in acute empyema of the tympanic cavity where the tympanic membrane is less involved in the inflammation and fever is present. In performing paracentesis I enter the knife at the lower half of the membrane horizontally and fairly near the periphery. One should avoid pricking the inner wall of the tympanum, because cases are known in which the sinus of the internal jugular vein has been punctured and haemorrhage has followed.

If there is already discharge from the ear one should merely insert pieces of perchloride of mercury gauze to soak up the exudation, and renew these very often. Pieces of wool are less suitable for the purpose because fibres readily stick to the sides and set up irritation, and may cause such undesirable complications as eczema, otitis externa, and even erysipelas. If the ear is to be syringed out once or twice a day it is best not to add any antiseptic to the water; these antiseptics are too weak to have any antiseptic action, and yet strong enough to cause irritation.

Boracic acid powder must not be blown in until the otorrhoea is no longer profuse. When there is swelling of the mastoid process it may be painted once a day with a mixture of equal parts of iodine and tincture of galls.

In severe cases of otitis media, when failure to hear the ticking of a watch held against the head shows that the labyrinth is also affected, as in scarlatina, measles and diphtheria, one should give sodium iodide internally directly the general condition of the patient admits it.

Under this treatment I have seen suppurative otitis media even in severe cases subside in a very short time without any complications, and during twenty-three years I can call to mind only two cases in which a temporary paresis of the facial nerve occurred, and only two patients, who by-the-bye did not strictly carry out the treatment prescribed, in

whom the mastoid antrum had to be opened up by operation, while many a case which otherwise would have been operated upon has healed under this treatment without any operation.

The most frequent complication of suppurative otitis media is extension to the antrum and mastoid cells, which often cannot be cured till the cavity has been opened by operation and surgically treated.

This operation is distinctly indicated when there is swelling of the soft parts over the mastoid, deep seated pain in it, bulging of the posterior superior wall of the auditory canal, and persistent high temperature, after a brief trial of conservative treatment. But one must not delay the operation—though no fever or pain be present—when other symptoms make it certain that there is pus in the mastoid cells and that cure without operation cannot be expected.

The early opening up of the mastoid process not only makes the diseased area accessible to surgical treatment, but prevents also the extension of caries of the bone by extension of the inflammatory process, affection of the cranial cavity, the lateral sinus, the cerebral meninges, or the brain itself, or extension along the sterno-mastoid muscle and burrowing of pus. If in the course of acute otitis media symptoms of sinus phlebitis appear, it may perhaps be still possible to check the process by freely laying open the mastoid cavity and opening the lateral sinus; while for symptoms of cerebral abscess trephining and exploratory puncture are indicated in order if possible to save the patient's life.

PROPHYLAXIS AGAINST CHRONIC PURULENT INFLAMMATION OF THE MIDDLE EAR

Chronic purulent inflammation of the middle ear is generally the result of acute inflammation, and the best prophylaxis against it will be early rational treatment of the acute otitis media, together with the endeavour to check and eliminate all factors which tend to make the inflammation chronic, such as the formation of large granulations or polypi during the acute inflammation, and extension of in-

flammation to the antrum, and treatment should be continued till the disease has been cured.

Under such conditions chronic purulent otitis media would soon become less common. We are nearer this goal today than formerly. The study of disease of the ear does not yet take the place it should in the medical curriculum, and is not an obligatory subject of teaching or examination; nevertheless there are cliniques and professional chairs for its study, and students and doctors endeavour to familiarize themselves with the study by their own wish and because they recognize the need for it. The fact that this knowledge about ear disease is becoming more common among medical men, and that the advances made in surgery have considerably helped this special branch of medicine, and enabled us to treat more effectively purulent inflammation of the middle ear, makes it more easy to fulfil the requirements of the prophylaxis described above: thus, to give an example, while formerly the extension of the inflammation to the mastoid antrum prevented the healing of the otitis media and caused it to become chronic, now in such a case we should during the course of the acute inflammation open up the affected part and cure it before it has had time to become chronic. But it is not possible always to exclude all circumstances which tend to make the process chronic in a given patient, and some cases of chronic otitis media will therefore always remain to be treated. In reference to these it is essential that they should be submitted to rational treatment as soon as possible in order to prevent future dangers. Two factors however stand much in the way in connexion with this. First there is the lamentable indifference shown by patients who have ear disease, particularly when it gives no pain and has affected one ear only, so that it does not make any very great difference in their power of hearing. This indifference may perhaps be in part owing to the former lack of aural surgeons and the hopelessness of much of the treatment. Also there is still a widespread prejudice amongst people against stopping a discharge from the ear lest it should "strike inwards," which makes many hesitate to be treated early, and many a life has been sacri-

ficed which might have been saved by proper treatment. How greatly this theory of "striking inwards" formerly fettered the mind is shown by Tröltsch, who tells us that in the early days of his medical work, after a chronic purulent otitis media had been healed, he put a seton in the arm and thus kept up suppuration for a time longer.

In the course of a chronic purulent otitis media there is often a stage in which less pus is formed and the ear no longer "discharges," but the pus becomes inspissated in the deeper parts and forms a crust which adheres firmly to the surrounding parts and causes the retention of any fresh pus which is being slowly formed. This retained pus, containing micro-organisms, sets up irritation, the inflammation and suppuration are increased, and the increased tension of the pent-up secretion produces pain, dizziness, and fever, till the pressure is great enough to overcome the obstruction and the pus escapes. With the re-establishment of the discharge the symptoms again disappear. Herein lies the grain of truth upon which the prejudice is founded. Certainly so long as there is suppuration the escape of the pus should not be obstructed, and there should be an easy and free outlet for it; but the inflammation should be cured so that the formation of pus ceases, and then there need be no fear of any "striking inwards," or to express it correctly any extension of inflammation to neighbouring parts, transference of micro-organisms, or of septic thrombi. There may be many who have chronic otorrhoea the whole of their lives and suffer no ill effects; but there are others again who lose their lives by the dangerous sequelae. To prevent these sequelae the disease should be treated as early as possible. It is to be hoped and indeed there are already signs that this indifference and prejudice will gradually be overcome by the spread among the people of a knowledge of the danger of the disease, of the necessity for early treatment and of the possibility of cure, and the good results which follow operative interference in these cases of chronic otorrhoea.

Narrowing of the external meatus will also be prevented,

for in the case of children where neglected chronic otitis media after scarlatina often leads to inflammation of the outer ear and thereby to hyperplasia of the walls of the external auditory meatus, narrowing of the auditory canal will occur. Such a stricture which sometimes barely admits the point of a probe makes it difficult for pus to escape from the deeper parts and leads to the formation of masses of retained secretion. Moreover it makes it impossible for the ordinary treatment to be carried out, and in order to cure the disease the stricture must first be removed by a radical operation.

Early treatment of chronic otitis media will generally also prevent caries, necrosis, paralysis of the facial nerve, and the formation of polypi; but if these are already present in any case which has been left to itself, they must be treated at once by operative interference and by drugs, because they keep up suppuration and prevent the free escape of pus. Care must be exercised in the use of the galvano-cautery.

When the inflammation is chiefly in the mastoid process or in the upper part of the tympanum "the attic," and shows its presence by foetor or by pus flowing from the aditus ad antrum, or appearing through a perforated membrana Shrapnelli, or by cholesteatomatous masses which come away from these parts, while very slight or no inflammatory changes can be seen in the tympanum itself, then the so-called radical operation is indicated as prophylactic in its proper sense. By removing the posterior upper wall of the external auditory canal and outer wall of the attic and remnants of the tympanic membrane, the malleus and the incus, the auditory canal, tympanum and antrum are thrown into one, and the danger of the spread of the inflammation to the interior of the skull is considerably lessened, because the inflammatory focus is now accessible for treatment, and the products of inflammation can freely be discharged.

But at a time when the patient has no longer any trouble arising from the diseased ear except a slight otorrhoea, which often apparently ceases altogether for a time, he

does not easily make up his mind to undergo a trying operation in which there is also the fear of an anaesthetic and other factors; and since the possibility of cure by conservative treatment is not altogether excluded, the latter method of treatment is for a time tried in the more favourable cases. The more favourable conditions for the conservative treatment are cases of chronic inflammation of the upper part of the tympanic cavity, where there is a very wide auditory passage, and the parts can be easily touched and syringed without causing giddiness, and the patient can come as often to the surgeon as he thinks necessary.

In this treatment I prefer also to remove the malleus and even the incus when I suspect caries of these bones. Even if these are found after removal to be free from disease, yet more space has been secured in the upper part of the tympanum and treatment is easier.

By pointing out to the patient quite early that he is being treated conservatively because he cannot make up his mind to undergo an operation for prophylactic purposes, the surgeon will to some extent reduce his own serious responsibility and let it rest partly upon the patient.

But where there are unfavourable conditions: a very narrow or constricted auditory passage, discharge of pus or of cholesteatomatous masses from the antrum or attic, and headache or giddiness, then a prophylactic operation must be more decisively urged and the responsibility of delay of operation be placed entirely upon the patient, because the morbid process often progresses in a more latent form towards the cranial cavity, and sets up morbid changes there which when they have led to symptoms make it too late for operative interference to be successful.

Rigors and cerebral symptoms in the course of a chronic purulent otitis media, when not referable to some other disease, but due to sequelae of the otitis media, are indications for radical operation to save life, and trephining of the skull as an ultimate resource.

It goes without saying that in operative interference with the mastoid process, especially in radical operations,

great care must be taken to guard the canal of the facial nerve (Fallopian canal) and the horizontal semicircular canal from injury, and that the strictest asepsis is needed for the operation and the after treatment.

Besides this vital importance of purulent otitis media we have also to take into consideration the functional disturbances caused by it; here again early treatment is required as prophylaxis, and in suitable cases an artificial tympanic membrane may be tried.

PROPHYLAXIS IN DRY PERFORATION OR DESTRUCTION OF THE TYMPANIC MEMBRANE

After the healing of chronic inflammatory catarrhal or purulent middle ear disease, the loss of substance in the tympanic membrane is, especially in adults, rarely replaced by scar tissue.

Although the mucous membrane of the inner wall of the tympanum, when the tympanic membrane is destroyed, may undergo epidermoid changes, and thereby become more capable of offering resistance, nevertheless it is advisable as a matter of prophylaxis to avoid all external injurious factors and prevent recurrence of the inflammation. Such patients should be advised to wear a piece of wool in the ear in bad weather, not to let water get into the ear, not to dip the head under water when bathing, and not to use any drops or syringing for the ear. In such cases I myself prefer to avoid syringing the ear, and try to remove any crusts and masses of cerumen in the auditory canal by forceps or curette, especially when the perforation is situated high up.

The artificial tympanic membrane may also set up irritation and in cases where the hearing of the other ear is good its use is not indicated. On the other hand the recent method of touching the edge of the perforation with a weak solution of trichloracetic acid is often successful in closing the aperture by scar tissue, and is thus of prophylactic value in protecting the tympanum.

PROPHYLAXIS IN OTITIS MEDIA WITH SCLEROSIS

The obscurity as to the causes of otosclerosis has not yet been cleared up; prophylaxis cannot therefore, properly speaking, remove the causes; yet clinical experience has taught us many facts with reference to this disease. First there is an hereditary factor which seems to be concerned in by far the greater majority of cases. We do not mean to imply that otosclerosis should be looked upon as a hindrance to marriage, though the severer forms of otosclerosis should be considered. It would seem moreover that excessive cold bathing in rivers and in the sea, energetic hydropathic treatment, many cold douches upon the head, may cause the disease to appear earlier or in a worse form in people who have an hereditary tendency to it, and that it may spontaneously produce the disease in people among whose relatives otosclerosis is not known. In these matters caution is therefore advisable, and people who are predisposed to otosclerosis should avoid these things altogether.

In women who have otosclerosis, quickly recurring pregnancies have an unfavourable effect upon the disease, and hearing often becomes worse after each childbirth. Everything too should be avoided which is associated with active or passive hyperaemia in the head, such as long continued work with the head bent forward, or in a stooping position, and prolonged mental exertion at night.

In cases where the disease is already present, prophylactic treatment should be adopted to check its further progress, and in order not to frighten the patient from the treatment by the unpleasant and often painful method of catheterization the Politzer method should first be used.

If later treatment by the Eustachian catheter is resorted to, a new catheter should be used if possible, which the patient may himself buy and bring with him, or a well disinfected catheter should be used and kept during the whole time of treatment for that particular patient. Catheters which have been used for syphilitic patients should not be used, even after disinfection, for other patients.

We must proceed very gently in catheterization to avoid

haemorrhage, and we should not let the patient get faint, and therefore he should not be allowed to stand, and help should be early given. The development of submucous emphysema must be prevented by holding the catheter firmly with the left hand, the right hand, which is used to squeeze the ball, should not be pushed forwards, and any resistance to the empyting of the ball should not be forcibly overcome.

Before the introduction of a catheter, which is generally made of celluloid, it must first be examined to see that it is perfect. If on inserting the catheter one meets with resistance, the kind of resistance must determine whether it is fixed in the isthmus or is pressing against the wall of the tube; in the latter case efforts to push it further would produce a false passage. After passing the catheter the ball should be gently emptied, otherwise emphysema is rapidly produced. In injecting fluids through the catheter we must beware of producing too great a reaction, thus setting up inflammation of the middle ear. Upon the whole the length of period of treatment should not exceed four to eight weeks; longer treatment might again diminish any good result gained in the power of hearing. When these patients use ear trumpets we should, in selecting one, make sure that the sound is not too piercing and metallic for the patient, and that in speaking into the tube one should not come too close or speak too loudly.

PROPHYLAXIS FOR AFFECTIONS OF THE NERVOUS APPARATUS OF HEARING

Statistics show that congenital deafness is common among children born of consanguineous marriages, and that there is also an hereditary factor, for parents who were previously not related to one another may have a child with congenital deafness if there is in the father's family, or more often in the mother's family, a case of deafness, for example a child of a sister of the mother may be deaf. Here I will merely say let the reader draw his own conclusions from these facts. Nevertheless deaf and dumb parents have brought forth

children with normal powers of hearing. If these children are to develop their powers of hearing and speaking early, they should be brought up amongst people who can hear well.

Alcoholism in the parents—most probably in the father—and conception during drunkenness are also said to cause congenital deafness in children. Moreover a connexion has been pointed out by Bischer between congenital deafness and certain conditions of climate and soil. These conditions are an isolated mountain district, with much intermarrying of the population and the soil formed of the strata of the trias formation. We have already said that if there is any doubt about the child's power of hearing it should be examined by a surgeon, and we must here again point out that in affections of the organ of hearing as the result of acute infective diseases, such as scarlatina, diphtheria and measles, early energetic rational treatment is urgently needed, with the use of sodium iodide internally. For these diseases often endanger the power of hearing through involvement of the nervous apparatus of hearing, and are the cause of most cases of acquired deafness. This early treatment will make it possible to prevent the harmful consequences, such as necrosis of the auditory ossicles, inflammation of the labyrinth with formation of connective tissue and ossification, necrosis and casting off of the necrosed cochlea and semicircular canals, and so prevent deafness. Early treatment is also essential for affections of the nervous apparatus of hearing in serous meningitis and epidemic parotitis, in cases where it is not possible to remove the children in time from the infected district. In cases of acquired deafness in order to save any power of hearing which still remains, the capacity for hearing should be tested, and if there be any, then exercises in hearing should be practised to maintain and improve the power of hearing that still remains. Children who had learned to speak and to read before they became deaf should be made to read aloud, and should also be compelled to speak by paying no attention to them when they point or make indistinct sounds; they will then not so easily lose their vocabulary of words and so not lose their power of speaking.

Recently, too, the very sensible suggestion has been made, and in some places has already been carried out, that in institutions for the deaf and dumb aural surgeons should examine the pupils on admission, determine the treatment to be adopted, test their power of hearing, and, if any be left, devise exercises in hearing for them.

There are also other diseases, such as anaemia, cerebral congestion, syphilis, leucaemia, diabetes, nephritis and malaria, in which the nervous apparatus for hearing may be sympathetically affected, and in these also early diagnosis and appropriate treatment and care may save the auditory nerve from further injury.

Apart from rough shocks to the auditory nerve by blows and falls upon the head, the unexpected sound of the firing of a gun, or by rarefaction of the air through leaving a diving bell too quickly, there are also certain occupations the noise of which so acts upon the ear that the auditory nerve, stunned for weaker sounds, becomes less susceptible to them: the so-called "occupation deafness" which locksmiths, blacksmiths, tinsmiths, coppersmiths and workers in manufacturing machinery develop in course of time. In such cases it would be advisable to damp the excessive sound by putting wool into the ears.

The organ of hearing of the engine driver is also in time affected by the shrill whistling and the bad weather to which these people are exposed; in these cases wool cannot be well used to stop the ears, because they require good hearing to control the movement of their engines, and to hear warning signals. The auditory nerve may also be affected by rheumatic affections such as those which attack the facial nerve, and these may produce temporary or permanent paresis, or paralysis, or deafness. The same thing may occur when a person who is overheated remains in a current of cold air, as in driving in an open carriage with an uncovered perspiring head. We must not only try to prevent such injuries, but when they have occurred must at least adopt appropriate treatment immediately. So too in Ménière's disease and in acute inflammation of the membranous labyrinth early diagnosis and treatment are of

great importance in preventing permanent injury to hearing.

According to Weber and Liel the power of hearing is considerably weakened by onanism.

Lastly mention must be made of the wellknown effect upon hearing of quinine, sodium salicylate, salol, tobacco and alcohol, and caution is therefore needed in their use, and a special warning must be given against alcohol. The hearing is also exposed to similar injuries by various poisons used in trades, as in poisoning by lead, mercury, arsenic and nitrate of silver.

The Prevention of the Diseases of the Teeth and Mouth

BY

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The Prevention of the Diseases of the Teeth and Mouth

During the brief period of barely half a century the art of dentistry, which had then as its object the removal of unsound teeth and the substitution of artificial teeth, has now developed into the highly valued science of dental surgery. The advances made have been so great that a scientifically educated man needs to devote himself wholly to the subject in order that he may be well versed in all its various branches. The general practitioner cannot easily follow up all the advances made in special branches, yet the subject is of such importance that the following remarks about the prophylaxis of diseases of the teeth and mouth will be very acceptable.

Daily experience shows that the general practitioner does not give to diseases of the mouth and teeth the consideration which they merit; yet the early treatment of these, or the sending of the patient to a dentist, might prevent many a trouble. But this is by no means the only reason why so many people suffer from their teeth. One of the chief reasons is that the true aetiology of many diseases of the mouth is still unknown. This is the case with the so-called caries of the teeth, which affects more than 80 per cent. among civilized races. And further our ignorance arises partly because so few authorities have studied the question, and very largely because the science of dental surgery is still so recent. There is a wide field for further inquiry here.

I. General Prophylaxis

It is well known that sound teeth and a healthy oral cavity are necessary conditions for general good health. The days when teeth and mouth washes were regarded merely as cosmetics are past, or at least should be past. In the daily use of these washes at stated times we have, so to say, the whole of the general prophylaxis and hygiene of the oral cavity, and the meaning of this I will explain in the following brief remarks.

Even in the healthy state the oral cavity is, to use Miller's expression, an almost ideal nutrient medium for micro-organisms. In pathological conditions other additional factors come into play which are favourable to the growth of bacteria, namely the dentine becomes softened by the caries, the dental pulp is exposed, irritation gives rise to exudations from the gums or edges of the gums, and there are also the products of the morbid changes.

Under these conditions the human oral cavity becomes a perfect breeding place and also a focus of infection for the whole organism, since it has been proved that most pathogenic bacteria find their way into the body through the oral cavity. How great is the number of pathogenic bacteria in the oral cavities of healthy and unhealthy individuals, and their nature, is shown by the following. In the saliva of 127 healthy individuals who were examined Netter found Fränkel-Weichselbaum's pneumococcus in 80 per cent. of those who had had pneumonia, and in 20 per cent. of those who had never had pneumonia; Friedländer's pneumonia bacillus was found in 4·5 per cent., streptococcus pyogenes in 5 per cent., and staphylococcus pyogenes in almost all the cases.

Biondi found in 50 cases examined that the bacillus salivarius septicus was present in 20; in a case of phlegmonous tonsillitis and in two cases of primary pulmonary erysipelas he found the streptococcus septopyaemicus; in one case of primary pulmonary erysipelas and in two healthy individuals he found micrococcus tetragenus which Koch first

isolated from phthisical sputum; and in one case of angina scarlatinosa he found staphylococcus salivarius pyogenes (which can be clearly distinguished from staphylococcus pyogenes aureus and albus) and local suppuration without general infection.

Kreibohm found in several cases in the fur which coated the human tongue two kinds of bacilli which proved to be highly pathogenic to mice. And Miller in his examination of diseased dental pulp found four kinds which proved highly pathogenic to white mice and less so to guineapigs and rabbits.

G. W. Cook of Chicago gives the following interesting results. In 220 examinations of the mouth he found in 107 cases staphylococcus pyogenes albus 47 times, staphylococcus pyogenes aureus 11 times, streptococcus pyogenes in 68 out of 107 cases, micrococcus tetragenus 11 times in 62 who were examined (and all these 11 suffered from phthisis), micrococcus pneumoniae in 7 out of 92 cases (who were all suffering from catarrhal affections of the lungs); the Krebs-Löffler diphtheria bacillus in 14, and the pseudo-diphtheria bacillus in 21 out of 186 cases; and in 171 of the 220 mouths examined this author found tubercle bacilli.

Vignal found ten kinds of micro-organisms in the faecal masses, five of which he had cultivated from the oral cavity.

These facts might easily be multiplied. Nevertheless they suffice to show even to indifferent optimists the great importance of care of the mouth and teeth.

Before passing on to the description of general prophylaxis a few important points still remain to be mentioned. There is no doubt that most bacteria in the mouth can, in consequence of the very favourable conditions, multiply readily and give rise to injurious effects, and that the statements I made above probably understate the case. On the other hand it must be remembered that a large number of bacteria are very quickly destroyed or removed with the sputum. And although we have no direct proof, yet we may conclude from analogy that the growth of this or of that kind of bacteria renders the

mouth unsuitable as a soil for other kinds, but on the other hand provides suitable soil for other kinds again which may settle there. The saliva too, which after remaining for some time in the mouth acquires an acid reaction, destroys many bacteria, although saliva by itself has no anti-bacterial action. The bacteria are also in part destroyed by their own products, or they use up the nutritive material in carious teeth or decomposed pulp, and thus remove the conditions which would be favourable to the growth of other kinds of bacteria. Others probably get into the stomach and are there destroyed by the hydrochloric acid.

How great is the number of different pathogenic bacteria in the oral cavity (not to mention the non-pathogenic) is shown by the large number of diseases which may be caused not only by local but also by general infection; but this subject cannot be entered into in detail here. It is worthy of note that the healthy epithelium makes infection very difficult, but that an injured mucous membrane, or one whose resisting power is diminished, makes the entry of pathogenic germs easy, though they may not produce any local effect, but affect more distant parts.

The observation that the number of pathogenic bacteria in an uncleansed mouth is much greater than in a cleansed mouth may be taken as a guide for the general prophylaxis of the diseases of the mouth. Cleansing of the mouth is thus a means by which we may considerably reduce the number of bacteria which it contains. The only questions that arise are (1) whether this is possible; (2) whether and how far it is necessary; (3) how it may be done.

Miller's researches show that the first question must be answered in the negative. In spite of the most careful mechanical cleansing and subsequent disinfection of the mouth it could be kept sterile only for a few minutes. First those six kinds of bacteria appeared which Miller terms proper to the mouth, and later other bacteria were found.

The second question is very important. That disinfection of the mouth is necessary is shown by the presence in it of

pathogenic germs. And as it is impossible to keep the mouth sterile for long, the question arises how far this is necessary. One might naturally think that it is an absolute necessity. But such is not the case, and the researches of Duclaux, Pasteur and Schottelius show that nutrition is not efficient without bacteria. Probably however the injurious may and should be destroyed and their development checked. Nature herself sees to it that the micro-organisms which are necessary to nutrition reappear in the mouth.

The question then arises how the cleansing and disinfection of the mouth may be best carried out. The researches of Roese have shown that simple cleansing with water is inefficient in the care of the teeth and mouth. He was only able to reduce the bacterial contents of the water used for washing out the mouth in the experiment (sterile sodium chloride and peptone solution) from 100 per cent. to about 40 per cent. after very long brushing. One must therefore resort to chemical antiseptics, as was first pointed out by Miller. In his work on the micro-organisms of the mouth this careful investigator has given the results of years of work, and these are still valid and have merely been improved upon by other writers. The principal agent in the care of the mouth is the mouthwash.

According to Miller a mouthwash should fulfil the following conditions—(1) It should be non-poisonous; (2) its reaction should be neutral, because acid as well as alkaline mouthwashes affect the teeth; (3) it should not corrode; (4) it should act as a germicide; (5) it should free the mouth from an unpleasant odour and refresh it; (6) it should have a pleasant taste. Experience teaches that a mouthwash will only be used by the public if it fulfils the last two conditions, and much attention should be given to this in prescribing. A mouthwash which has an unpleasant flavour will not be generally used even though its value is supported by the highest authorities. One must also guard against using any of the many substances which are sold for the teeth, and often recommended by the most exaggerated advertisements, unless one is sure of their action. The mouthwashes which can be bought fail

almost without exception in their object, and for this reason alone are much too dear. Many too contain substances which are very bad for the teeth, such as salicylic acid or alum. Others again certainly contain some antiseptic substances but in far too small a quantity, or incapable during the very short time they remain in the mouth of acting efficiently. We have to consider not only the disinfecting power of the mouthwash in general, but also its rapidity of action. Of the substances which can be used for disinfecting the mouth only in a certain strength many must therefore be excluded. The table on the opposite page, drawn up in accordance with Miller's researches and taken from my "Diagnostic and Therapeutic Pocketbook for Dental Surgeons," gives a concise view.

This table shows that very few substances can be used to disinfect the mouth quickly. From among those which sterilize the mouth in a short time we must exclude iodine trichloride and salicylic acid, because they affect the calcareous parts of the teeth. Corrosive sublimate in combination with benzoic acid is very effectual, because the former combines with the superficial layers of the mucous membrane to form an albuminoid compound, which is a very unfavourable soil for bacteria. Miller recommends the addition of corrosive sublimate to the extent of eight parts to the following mouthwash:—

	Parts.
Acidi benzoici	30
Tinc. eucalypti	150
Alcohol	1000
Ol. menthae piperitae	7·5

Enough of this should be added to half a wineglass of water to make it distinctly muddy in appearance. Miller maintains that corrosive sublimate is perfectly harmless, but others advise against its use, and rightly so, because apart from its disagreeable taste, the poisonous properties of corrosive sublimate cannot be lightly estimated.

As disinfectants there remain then only benzoic acid, borobenzoic acid, saccharin, thymol and listerin. Of these Miller has given up thymol because of its very unpleasant

Antiseptic.	Strength in which antiseptic can be used in the mouth.	Time required to sterilize the mouth.
Benzoic acid	1 in 300 to 1 in 200	2–2½ min.
Boric acid	1 in 50	Over 11 ,,
Borobenzoic acid	1 in 175	1 to 2 ,,
Carbolic acid	1 in 100	,, 5 ,,
Eugenol	1 in 750	,, 10 ,,
Eucalyptus oil	1 in 625	,, 8 ,,
Hydronaphthol	1 in 1,500	,, 15 ,,
Iodine trichloride	1 in 2,000 to 1 in 1,500	1¼ ,,
Potassium chlorate	1 in 40	
,, permanganate	1 in 2,500	
Pine oil	1 in 360	,, 19 ,,
Solution of aluminum acetate	1 in 20	,, 5 ,,
Listerin (American preparation consisting of eucalyptus oil, borobenzoic acid and oleum gaultheriae)	—	,, ¼ to ½ ,,
Lysol	1 in 200	,, 5 ,,
Oil of cloves	1 in 550	,, 11 ,,
β-naphthol	1 in 1,500	,, 10 ,,
Oil of peppermint	1 in 600	,, 11 ,,
Saccharin	1 in 400	¾ to 1 ,,
Soluble saccharin (1 part of a saturated alcoholic solution in 10 of water)	1 in 120	,, 5 ,,
Salicylic acid	1 in 300 to 1 in 200	¾ to 1 ,,
Perchloride of mercury	1 in 5,000 to 1 in 2,500	2 to ½ ,,
Thallin sulphate	1 in 1,000	,, 6 ,,
Thymol	1 in 2,000	,, 5½ ,,
Hydrogen peroxide	10 in 100	10 to 15 ,,
Oil of wintergreen	1 in 350	,, 12 ,,
Oil of cinnamon	1 in 400	,, 8 ,,
Zinc sulpho carbolate	1 in 250	,, 7½ ,,
Eau de Botôt	—	,, 15 ,,
Eau de Pierre	—	,, 11½ ,,

taste, and saccharin because it is unbearably sweet, and he prescribed the mouthwash given above without thymol, and later replaced the eucalyptus tincture by rhatany tincture. Listerin, which is very useful but has not been introduced among us, is used by putting a few drops on the toothbrush. More recently Roese has also made investigations into mouthwashes, and has added considerably to the work done by Miller, and added a few other newer substances. Roese found that some substances had a

momentary good effect, others a permanent good effect. To the former group belongs formaldehyde; to the latter benzoic acid and "odol"; corrosive sublimate belongs to both.

The following points in Roese's work are worthy of mention. Sublimate is a good disinfectant, but is not suitable for general use.

Miller's benzoic acid mouthwashes are only effectual in ten per cent. fresh solutions.

Ethereal oils are, as Miller and Riedlin have already shown, without effect.

Hydrogen peroxide, which as a three per cent. solution has been put on sale in Berlin as "katharol," is unsuitable for daily use because of its acidity.

Potassium permanganate has after effects but no immediate effects, and moreover produces manganese binoxide, which is so difficult to remove. It is useless as a mouthwash, but very suitable for after treatment in fractured jaw.

Potassium chloride is recommended by Unna for a daily mouthwash, but it is not good. It softens the gums when in constant use, and may sometimes produce toxic effects, especially as it may accumulate in the body.

My former statement that formalin was unsuitable as an addition to mouthwashes, has been proved by Roese to be experimentally correct. Formalin hardens the mucous membrane of the mouth, and thus forms a good soil for bacteria; it corrodes and has an unpleasant taste which cannot be removed. These properties of formalin still persist in the formalin mouthwashes which are sold as "desodor" and "kosmin."

Roese confirms the statements made by Miller about eau de botôt and salicylic acid. Alum too must not be used: mouthwashes which contain these substances and have been recommended must therefore be given up.

Salol too is not suitable as a mouthwash, because when it comes into contact with the living cell it splits up into salicylic acid and phenol. But the case is quite different with odol antisepticum. This is similar to salol, but probably

a salicylalbumin compound which does not injure the teeth and which is, according to Hefelmann, especially bacteriocidal in the nascent state.

As odol is harmless and has no unpleasant taste it may be recommended for use, even though it does not fulfil all the conditions of a good mouthwash.

Roese made experiments also with alcohol, and found that it had the greatest effect in disinfecting the mouth when diluted to sixty per cent. With this strength the alcohol must only be used to paint the gums or be put on the tooth-brush. The mucous membrane of the mouth only tolerates it when diluted to thirty per cent., and the effect of this is no better than five per cent. odol, or ten per cent. solution of Miller's mouthwash, and the effect of the latter may be still further increased by adding physiological saline solution. The latter has, according to Roese, when it is lukewarm a power of checking the development of bacteria, and may be recommended therefore when warm for use by poor patients, and it is certainly to be preferred to Seifert's prescription of one teaspoonful of sodium bicarbonate to half a litre of water to which a piece of camphor is added. Alcohol has other effects besides that of destroying germs. Its property of dissolving fat is not unimportant; but most important is its action upon the circulation, which it increases. Experience has long shown that the metabolism of an organ is increased by improving the circulation of blood through the organ; the metabolic products which have accumulated in the tissues are mechanically taken up by the blood current, carried away and destroyed. That is the reason why alcohol has always been added to tooth-tinctures.

From what has been said it is plain that we have no mouthwash which fulfils all the requisite conditions. Recently attempts have been made to prepare a mouthwash which should consist of alcohol and an antiseptic. Witzel has a liquid alcoholic tooth-soap prepared in Dr. Siebert's chemical manufactory, which is said to combine the advantages of an antiseptic mouthwash and of a mechanical cleansing substance. We shall have to wait in order to

know what are its results. For the present we have to fall back upon a combination of several antiseptics as a mouth-wash.

I have tried and can recommend the following combination which is pleasant to the taste :—

	Parts.
1. Thymol	·2
Acid. borobenzoic	1.5
Saccharin	·05
Tinct. kramer.	5 to 10
Spir. vini rectif.	100
Ol. menth. piperit.	1.5
Ol. anisi	·5

The following preparation has a stronger taste :—

2. Thymol	·2
Acid. borobenzoic	3
Saccharin	·5
Menthol	3
Tinct. kramer.	10
Eau de Cologne	25
Spir. vini rectif.	100
3. Acid. borobenzoic	5
Menthol	5
Tinct. kramer.	15
Eau de Cologne	50
Spir. vini rectif.	100
4. Saturated solution sod. chlorid.	70
Acid. borobenzoic	3
Saccharin	·5
Tinct. kramer.	15
Spir. vini rectif.	100
Ol. menth. piperit.	1
Ol. anisi	·5
5. Saturated solution sod. chlorid.	70
Acid. borobenzoic	3
Saccharin	·2
Tinct. kramer.	15
Eau de Cologne to	100

Of these tinctures thirty to forty-five drops, or if they contain sodium chloride double this quantity, are added to three ounces of water, and it is then ready for use.

All five prescriptions contain a quantity of tincture of rhatany. By its astringent and tonic action the latter maintains the mucous membrane of the mouth in a healthy condition, and as experience shows that we must not place too great reliance upon the bactericidal power of a mouthwash, it affords a prophylaxis which must satisfy us for the present.

The use of the toothbrush is very valuable in helping to keep the gums healthy. The friction produced by it makes the gums firmer and more capable of resistance. The brush should not be too soft and also not too hard. A medium hardness suffices in most cases. Gums which bleed when it is first used soon acquire the normal consistency, and will then no longer bleed when they are brushed, provided of course that all factors which might cause a gingivitis have been removed. The teeth should be cleaned in all directions, the front and back, and the masticating surfaces, and in a horizontal and a vertical direction. The toothbrushes which have been devised for this purpose do not seem to be any more useful than the ordinary straight toothbrushes. The use of the toothbrush several times a day is indispensable and cannot be replaced by the use of an antiseptic mouthwash.

Before using it the teeth, or rather the interstices, should be mechanically cleaned by a soft toothpick of tortoise-shell, wood, or quill, or a waxed silk thread, care being taken not to injure the interdental papillae. A toothbrush and mouthwash should then be used to brush the teeth and gums, and finally the mouth should be rinsed out with the same mouthwash. This should be done in such a way that by the gargling as much as possible of the mouth, wash is brought into contact with the mucous membrane, while another fresh quantity is made to pass in the interstices between the teeth by the action of the buccinator muscle. But when it is desired to let the disinfectant act upon the hinder parts of pharynx, for example as a prophylactic against diseases of the throat, then it is best to use the following lozenges both for children who cannot gargle and also for adults, because the hinder parts of the pharynx generally escape in gargling.

1. Coffeae tostae 75
   Pulv. acid. boris 25
   Saccharin . . . . . ·65
   Tinct. vanillae, mucil. acaciae . . . . . qs.
   Make into lozenges of ten grains each.

2. Sacchar. 200
   Ol. menth. piperit. 1
   Thymol . . . . . ·2
   Alcohol absol. 2
   Succ. limonis et tinct. vanillae . . . . . qs.
   Make into lozenges of ten grains each.

3. Sacchar. alb. 100
   Saccharin . . . . . ·3
   Alcohol absol. . . . . ·2
   Thymol . . . . . ·2
   Ol. menth. piperit. 1
   Fructus citri et tinct. vanillae . . . . . qs.
   Make into lozenges of ten grains each.

The last two prescriptions are recommended by Hartmann during epidemics of diphtheria. Szana mixes a grain of saccharin, and a grain of guaiacum resin with ordinary sugar and has them made up as sweets. As the last three prescriptions contain sugar, this method might be of advantage for children in special cases. I would recommend the use of the first prescription.

The "oriental pastilles" which are sold contain tartaric acid and cannot therefore be recommended. The proper time for cleaning the mouth is after every meal and before going to bed. The latter is very important, because during the night the conditions for fermentation are the most favourable.

It remains for us now to consider tooth soaps and tooth powders.

Tooth soaps consist mainly of soap, and their daily use is not advisable because there is really no neutral soap, and the smaller or greater quantity of alkali contained in all soaps relaxes the mucous membrane of the mouth.

But one need not altogether give up using a little soap with the tooth powder, for experience shows that most people with healthy buccal mucous membrane bear it very well. When the gums bleed easily the addition of soap is

contraindicated. Tooth powder has only a mechanical cleansing value, the chemical or antacid action is but slight. Moreover it has the disadvantage of remaining in cavities, and prevents the mouthwash from acting there. For well-cared-for teeth a tooth powder should be used at most once a week. It should contain no injurious or fermentable substance. Coal ashes, wood ashes, or cigar ashes and toasted bread should not be used to clean the teeth. I recommend the following:—

1.	Calc. carb. praecip.	100
	Magnes. carb.	10
	Sapon.	5
	Ol. menth. piperit.	1
2.	Calc. carb. praecip.	100
	Magnes. carb.	20
	Sapon.	5
	Saccharin	·1
	Ol. menth. piperit.	2
3.	Calc. carb. praecip.	40
	Magnes. carb.	10
	Saccharin	·75
	Acid. benzoic.	1
	Ol. menth. piperit.	1
	Carmin.	·5

A happy medium between tooth powders and tooth soaps is formed by the so called tooth pastes which are of doughy consistence, and contain substances both for cleaning and disinfecting purposes. There should be no honey or fermentable substance in the paste. This is not found in Miller's prescriptions, nor in those given in my "Diagnostic and Therapeutic Pocketbook for Dental Surgeons." My own prescription has been a little altered to the following:—

Calc. carb. praecip.	50
Magnes. carb.	5
Sapon.	15
Pulv. myrrhae	15
Glycerini	20
Spir. armorac.	5
Ol. menth. piperit.	2
Ol. myrrhae	2
Carmin.	·2

In concluding this General Part, I would point out that antisepsis and asepsis must not be omitted even in slight operations in the mouth. One must always remember that the pathogenic germs in the mouth can very easily get into the blood stream through the open blood and lymph vessels. The operation area should be properly disinfected, the hands by Fürbringer's method, and the instruments by formalin vapour, which will probably be found the most convenient.

For the rest, reference should be made in this text-book to the sections on surgical diseases.

II. Special Prophylaxis

Special prophylaxis in diseases of the teeth and mouth has not only to deal with diseases in the proper sense of the word, but also with those physiological symptoms and accompaniments of dentition which one cannot look upon as morbid, but only as pathological, and not influencing the general health.

I. DENTITION

We have long been accustomed to speak of the teeth of the first dentition as "milk teeth," and of those of the second dentition as "permanent teeth." Although this division cannot be justified, because the permanent molars in their development belong to the first set of teeth, and are analogous also to the milk teeth, yet in what follows the old division will be retained.

The normal commencement of eruption of the milk teeth is the seventh or eighth month, but it may be later even in well nourished and well developed children.

In order to minimize the unpleasant symptoms often associated with the eruption of the teeth in children, a careful diet and attention to the skin are required. Experience has shown that breast-fed children cut their teeth most easily. The mouth needs to be kept very clean during dentition. To wash it out one should use wool or gauze, or a camel's hair brush which is kept constantly in

a disinfectant (such as a solution of boric acid and thymol). The constant wiping out with pieces of old linen wrapped round the finger is inadmissible.

Any abnormal symptoms, gastric and intestinal disturbances and nervous symptoms, should always be carefully watched, because they do not always arise in connection with dentition. The saliva which often flows in large quantities should be constantly wiped away to prevent the adjacent parts of the skin from becoming sore. The irritation of the gums is often relieved by biting rings and similar objects of bone; all applications such as honey, or butter, which tend to soften the tissues, are to be forbidden.

The gums should certainly not be lanced. This proceeding which Graser still recommends in rare cases, advising that an oval piece be cut out, is not only useless but even dangerous. The more recent researches of Robin show that the dental sac forms a protecting covering for the tooth until it is completely cut. If the dental sac is cut open, and this is necessary in order to make a free passage for the tooth, then in most cases there arises a severe infective inflammation which cannot but be bad for the germ of the permanent tooth, and causes the child greater pain than it would otherwise have had. Robin was able to prove this experimentally in dogs. Moreover the wound and the pain prevent the child from sucking properly, and its nutrition suffers. For pain in the gum we may order it to be painted with eucain.

1. Eucain hydrochlor. . . . . ·1
   Syrup. simplic. 10
   Tinct. croci . . . . . gtt. x.

2. Eucain hydrochlor. . . . . ·1
   Sod. chloridi 1
   Glycerin 10
   Aqu. dest. 10

For very severe inflammation Muskett paints the gums several times with the following:—

Zinc. chlorid	·6
Aq. dest.	30

For the prevention of general diseases and nervous affections in teething children, see the section on the Prophylaxis of Diseases in children. In this place we have to consider local symptoms only. But a question which is often put to the physician or dentist is, whether the milk teeth require any care, or when should it commence. All the injurious influences mentioned in the general part may affect the child's mouth as much as the adult's, and care of the teeth is therefore just as necessary. It has already been said that the mouth should be cleaned with a camel's hair brush. One can commence to teach the care of the mouth from the third year onwards; children of six or seven years should be able to clean their teeth and mouth.

Carious milk teeth should be stopped in order to prevent other complications, such as stomatitis, inflammation of the pulp and abscess.

The eruption of the permanent teeth is much easier than that of the milk teeth. That the cutting of the permanent teeth may be regular, care must be taken that the milk teeth are not destroyed before their time, because inflammation and abscesses of these may injure the germ of the permanent teeth, and because by early extraction abnormalities in position may arise. When a milk tooth is removed and the permanent tooth does not quickly fill up the gap, this becomes smaller by the approximation of the neighbouring teeth, and the permanent tooth which subsequently appears must take an inclined position, i.e. forwards or backwards relatively to the alveolar arch. On the other hand the milk teeth or their remnants must not remain too long in the mouth, but be removed in time to prevent similar ill effects. The milk teeth require therefore good and constant supervision and treatment by a dentist just as do the permanent teeth, and we should not allow them to take their own course because they will be replaced by others.

Much trouble is sometimes caused by the eruption of the lower wisdom teeth. In many cases we can prevent this

by endeavouring to remove the main cause of the trouble, namely want of space.

There are according to Sternfeld three methods which may be employed: (1) Grinding away of part of a tooth. (2) Expansion. (3) Extraction.

The first two methods are only used in special cases which cannot be further described here; the third is an extremely important and trustworthy prophylactic measure for ensuring the unobstructed eruption of the wisdom tooth, and in a wider sense for the good order of the entire set of teeth. The only question is which tooth is to be extracted. The first permanent molar is the weakest tooth and most likely to decay early, and we should therefore think of this tooth when the teeth are too crowded, and extraction is necessary both for the sake of the front teeth as well as of the molars. In some cases one would sacrifice a bicuspid on each side when these are very carious while the first molars are in good condition. In very rare cases we may proceed to extract the second molars. While formerly I took the view that we should in almost all cases endeavour to keep the first molars, I now agree with Sternfeld. There is only the question which is the best time for the extraction of the first molars. Sternfeld gives the period from eleven and half to the thirteenth year, that is before the eruption of the second molars, and that corresponds fairly with the date I recommend, namely, before the complete eruption of the second molars and after the appearance of the first bicuspids. The difference between the two periods, the eleventh to fourteenth, and tenth to thirteenth years, amounts practically to one year. Till this time then the first molar should be kept. But if the proper time for the extraction is past, or if it was unnecessary to make an extraction at that time, there remains often no choice between sacrificing the third molar itself, or the second molar, because thus only can further harm be prevented. It is obvious that we are speaking now only of severe cases; for less severe cases symptomatic treatment is appropriate.

II. Abnormalities

I have already said that by proper care of the milk teeth we can in many cases prevent anomalies in position of the permanent teeth. Too early or too late extraction of the milk teeth must be avoided. We must try to preserve the lower incisor teeth, the upper canines, and the second molars of the milk set, until the permanent teeth appear.

Special mention must be made of the treatment to be adopted in cases where the milk teeth are still firmly fixed, that is, the fangs are still unabsorbed. Here we have to consider in each case whether the place is to be kept open by letting the tooth remain, or not. Extraction is often indicated, and often too expansion. But as the latter method does not always give the desired result, extraction is indicated for primary lack of space. The same principles apply here as were given in the treatment of difficult eruption of the wisdom teeth. The first molar is still to be regarded as the best for extraction. But we must urgently warn against the mistake of drawing the first molar and then for the sake of "symmetry" proceeding at once to the extraction of two, or even of all four first molars, as has been recommended by several dentists, by Jessen among others, and recently by W. Mitchell of London, "even though they could be perfectly well stopped."

By the extraction of one tooth the children are often saved from tedious procedures, because self regulation often sets in. We must warn however against any unnecessary extraction after all the teeth have appeared. Modern dentistry has advanced so far that it is now possible to save very many teeth which formerly would have been extracted by forceps. By keeping the teeth we prevent many changes in position and their consequences, such as loosening and subsequently falling out, which are caused by removing those opposed to them. This is not the place in which to describe in detail all the prophylactic measures which are possible to prevent anomalies of position, we can only mention the most important, and shall therefore give the

prophylaxis of a few of the most important abnormalities of the alveolar arch. It is obvious that prophylaxis is possible only in the case of secondary anomalies.

The most important is prognathism. The chief cause of this anomaly is the defective development or early loss of the first permanent molars, and it is therefore clear how very important it is to preserve the first molars, at least temporarily.

If these are early lost, the other teeth, namely the upper incisor teeth, have to make good this loss; they must bear the entire force of the masticating muscles and yield in the forward direction. In the same way, primary, so-called physiological prognathism may be made worse. In both cases the result may be disturbances in speech and in mastication which might very easily be prevented by at least temporary preservation of the first molars. Among the remaining forms of pathological prognathism, prophylaxis is, according to Sternfeld, possible only in that form which is the accompaniment of so-called contracted jaw. A contracted jaw is said to be caused by constantly keeping the mouth open, as a consequence of adenoid vegetations in the naso-pharynx or enlarged tonsils, and might be prevented by early removal of the growth or of the tonsils.

But according to Danziger, the cause is in very many cases different; for the contracted jaw is a result of primary mal-development of the skull, in which the adjoining bony parts of the nose are also cramped, so that the patients are obliged to breathe through the mouth, and this may give rise to pathological prognathism which cannot be prevented. Sometimes prognathism may be caused by sucking the thumb or lips, or by the pressure of the tongue. If these bad habits are seen in children, they should be checked.

I doubt very much whether it is possible to prevent true so-called "open bite" where the last molar teeth alone meet. According to the few observations I have been able to make, adenoid growths and hypertrophy of the tonsils are not the cause of this. Where such cases have been described in medical literature, they have been confused with the

forms of contracted jaws mentioned above. We must also briefly mention defects in the teeth. The so-called wedge-shaped teeth are, it is almost certain, not produced by brushing vertically with the toothbrush, as is still often assumed to be the case; the nature of these is still obscure, and nothing can therefore be done by way of prophylaxis. Repeated touching with nitrate of silver relieves the pain which often occurs in these cases. We are also powerless to prevent so-called rhachitic teeth, falsely called Hutchinson's teeth. While we continue to be ignorant of the influence which the dyscrasias, such as rickets, exercise upon the teeth, we cannot speak of any prophylaxis of the enamelhypoplasia, for such it is. We only know that nutritional changes during the period of their development must be the cause.

This knowledge presses upon us the question whether anything can be done to promote the regular development and normal eruption of the milk and permanent teeth. I discussed this subject in an address in Kiel, in 1899, and will briefly refer to it here.

The whole question is whether we possess means by which the development of the teeth may be assisted. An exact answer cannot at present be given, as hardly two authorities have obtained the same results in their researches. Although according to Miller it may sometimes happen that bad development of the teeth is caused by deficient lime in the food, yet in most cases it is caused by imperfect absorption or assimilation of lime salts, which are contained in a sufficient quantity to build up bones and teeth even in the poorest diet. If deficient lime salts and phosphates were the cause of the defective development of the teeth, the mischief could be removed by the administration of lime salts, but such attempts have hitherto done no good. It is much more probable that the function of the organs of assimilation, of the odontoblasts and ameloblasts is imperfect. But when the formative cells are incapable of normal assimilation the administration of inorganic salts for the better development of the teeth is useless, and has been tried, naturally without success. Doses

of phosphorus, $\frac{1}{130}$ to $\frac{1}{75}$ grain, are probably also useless, since Mira and Streltzner have proved by experiments on animals, that treatment with phosphorus never causes the deposit of lime in tissues which are deficient in lime, and probably therefore not in teeth badly formed from defective action of the formative cells. Beraz earlier came to the same conclusion in his researches into the "value of lime for the teeth." In more recent times Dr. Deninger of Mayence has recommended that calcium fluoride, in doses of $1\frac{1}{2}$ grains in the day, be given to the mother before the birth of the child. But we now know that lime salts cannot thus be withdrawn from the maternal body in favour of the foetus, and therefore we cannot thus influence either the development of the teeth or the structure of those already formed. The latter is impossible also for the reason that what has already been organized in the teeth cannot be altered. We must not omit to mention researches, especially by Röse, to discover whether the amount of lime contained in the soil, and therefore in the drinking water, has any influence upon the resisting power of the teeth. Röse thought that he had proved the influence by statistics, but other authorities, myself among them, have obtained very different results, and new investigations are needed to settle this question.

Although the prospects of improving the development of the teeth by external measures are as yet very poor, certain points must nevertheless not be neglected. As it is known that heredity plays a large rôle in development, and that the way of living and nature of the food exercise an undoubted influence upon the animal organism, we are able to suggest the following prophylactic measures. First of all, we must ensure hygienic conditions of life, fresh air and proper food. Effeminacy, which has undoubtedly appeared among the richer classes, must be combated. During the dentition period there is no real substitute for milk. Later, food containing sufficient lime should be given, the carbohydrates restricted in amount, and the food thoroughly well masticated. The act of mastication compels the muscles to work better, and this causes a better circulation

of blood to the parts around the teeth, and thereby an increased deposit of lime salts and a normal eruption of the teeth. This has been proved experimentally in dogs by Robin. It may also safely be assumed that, to quote Walkhoff's words, "the inheritance of an active formative material" also plays a part.

III. Diseases of the Teeth and Gums

The few preventive measures which have been recommended to ensure a better development of the teeth will be also, in the wider sense, prophylactic against disease of the teeth, such as dental caries. The greater the power of resistance of the teeth, the less will they be affected by caries.

I do not for a moment mean to imply that dental caries can be most effectually prevented by the measures described in the previous chapter, because caries begins most easily at those places which the microscope shows to be least well developed, and this may be the result of nutritional disturbances of the whole body during the developmental period of the teeth.

On the other hand we are in a position to deal with the direct predisposing causes, which are external conformation and position of the teeth, and abnormal fermentative processes, as well as the exciting causes, namely acids and micro-organisms. According to Miller prophylaxis may proceed along three different lines: (1) operative interference; (2) measures to ensure a good development of the teeth; (3) care of the teeth.

Operative procedures consist first in treating retention, removing irregular carious teeth, that is those which stand out beyond the alveolar border, grinding away projecting edges of old stoppings, regulation of the teeth and treatment of all carious spots. All these are matters about which only a dentist can decide. In regulating the teeth, a very tedious matter, care must be taken that the result is adequate to the trouble taken. Often the extraction

of one tooth will be of more value, but one must guard against unnecessarily sacrificing a sound tooth. The six-year molar has already been mentioned in this connection.

The carious places must be made harmless by the application of nitrate of silver or by stopping.

Nitrate of silver may only be used for flat cavities and in milk teeth. In other cases stopping is the best preventive measure for caries. An artificial stopping is often ideal for healthy strong teeth. But every one does not understand how to put in a good stopping. Above all the patient must beware of getting into the hands of a quack, for very often mistakes cannot be made good. Moreover no one kind of material is suitable in all cases. The choice must be left to the dentist. In order to prevent caries from becoming very extensive the teeth should be examined by a dentist every six months and treated so as to prevent further complications.

The measures to ensure a good development of the teeth have already been mentioned. The rules given in the general section about the care of the mouth for the removal of acids, abnormal fermentative conditions and micro-organisms, are applicable here also. In order to prevent disease of the pulp and periodonteum the measures recommended above suffice in general because these are caused in most cases by far-advanced caries, idiopathic disease of the pulp and periodonteum being comparatively rare. When once the pulp of a tooth is diseased simple stopping will not do. In spite of all advertisements in which the curative power of substances which contain formalin is specially praised, it cannot be too strongly maintained that the permanent preservation of a tooth with diseased pulp can only be secured by destroying the pulp with arsenious acid and a subsequent stopping of the fang. This is also true of teeth the pulp of which is already purulent or gangrenous or has given rise to a dental fistula. Such teeth do not require to be extracted but can be saved. Much certainly depends upon the skill and scientific training of the dentist entrusted with the case. Diseases of the periodonteum and their sequelae,

such as fistula, abscess, necrosis of the alveolar border, empyema of the Antrum of Highmore, pyaemia and septicaemia, are best prevented by extraction of the tooth and care of the mouth.

Here we must also mention pyorrhoea alveolaris. As we are in complete ignorance of the cause of this disease nothing can be done to prevent it. But by appropriate therapeutic treatment we may attempt to check its further progress.

Partsch considers that only those cases of disease can be regarded as genuine pyorrhoea alveolaris "in which with healthy—I would add apparently healthy—gums pus exudes from the alveoli, although there are no deposits of tartar or other apparent cause for the suppuration." I can recommend the following as a fairly effectual treatment: the alveoli must be cauterized with the thermocautery under cocaine anaesthesia, opened up and treated with an alcoholic solution of corrosive sublimate. If a repetition of these measures seems indicated, the cavities should be plugged with iodoform gauze. As a prophylactic mouthwash I have successfully used a solution of hydrogen peroxide diluted for use with two-thirds of water. In many cases treatment is quite useless. Sometimes I have seen a decided improvement after the use of Karlsbad or Marienbad water, from which one may assume that the cause of pyorrhoea alveolaris is often to be found in some constitutional anomaly.

The diseases of the gum and their sequelae may also in general be prevented by care of the mouth and teeth, and there is no need therefore to say more about them here.

PROPHYLAXIS IN THE EXTRACTION OF TEETH

The country practitioner, who cannot always send his patients to a dentist, has often to perform extractions.

Much experience is needed for the skilful extraction of teeth, and as I know from experience how many mishaps may occur to one who has little practice, a few practical remarks will probably not be out of place here.

The young doctor who is going to practise in the country should be urgently advised first to attend a dental hospital, and secondly in selecting his instruments to be careful to get good tooth forceps, because those sold by many dealers to young doctors are sometimes of old pattern and not very serviceable.

Probably the commonest mishap is a fracture of the crown of the tooth. This cannot always be avoided, yet it is advisable with very carious teeth not to place too great reliance upon the grip of the crown, and rather to make use of the stump forceps at once than when too late.

Injury to neighbouring teeth is generally due to want of skill in the operator. It can only be prevented by great care. Very rarely the roots of the second milk-molar grasp the crown of the permanent second bicuspid, and this is drawn when the former is being extracted. This is unavoidable as we cannot see into the bone.

Secondly the jaw may be injured. Fracture of the jaw is hardly possible if the operation is at all skilfully done. However it is occasionally met with. To prevent it one should be sure not to use the "key" which unfortunately is still used in most German military hospitals.

Fractures of the alveolar margin are very often caused by taking too wide a hold of the alveolar border with forceps which do not bite. This misfortune and further complications can only be prevented by using proper instruments.

Thirdly injury of the adjacent soft parts is possible. Small tears and bruises are often unavoidable in difficult extractions and do not much matter. In order to prevent large tears when the teeth are very carious, brittle or have very deep roots, and the whole root must be firmly held to ensure a successful extraction, the gum must be previously incised with a scalpel or a fine stump forceps must be passed deeply beneath the gum. The removal of the alveolus with the gum cannot be called good, but is better than breaking the bone without any final result. For the lower molars, where the anatomical conformation of the lower jaw does not permit of the forceps being

passed so deeply towards the root, one is obliged to resort to leverage. The unskilful use of the elevator may cause serious injuries of the cheeks, lips and tongue, as well as dislocation of the jaw. One should never forget to have the instrument entirely in the hand, the thumb being held close to the end so that when the instrument slips up the thumb may receive the blow while the other hand makes counter-pressure on the jaw.

Fourthly a few complications must be mentioned. These are suppuration and pyaemia, also the disappearance of the extracted tooth or of a tooth plate down the pharynx. After even a trivial tooth operation one has seen not only suppuration but also not seldom pyaemia and septicaemia with a fatal result, and therefore antisepsis and asepsis must be strictly carried out in all dental operations. Although antiseptic after-treatment may not be necessary for the smaller operations, it is an urgent necessity for larger operations.

The slipping of a tooth into the pharynx ought never to occur. If one cannot be quite sure of being able to avoid this when the patient is under an anaesthetic and there is very much blood and saliva, the isthmus of the fauces should be protected by a piece of gauze. Artificial teeth should be removed before giving an anaesthetic. Cases of neglect of these precautions are often reported, and reference is therefore made here to the danger of this neglect.

IV. Diseases of the Mouth and Jaws

In order to prevent diseases of the mouth and jaws it is very essential to keep the mouth and teeth healthy by proper care, according to the rules given in the general part and in the foregoing chapters of the special part. Special precautionary measures are available for certain diseases.

Alveolar abscess is most easily prevented by keeping the teeth sound; further complications are prevented by extracting the offending tooth, or by antiseptic treatment of it.

The same may be said about the prophylaxis of dental fistulae. Fistulae of the cheek generally result from gross neglect, and frequently from concealed septic stumps, which should be at once removed.

Necrosis may in many cases be prevented by careful after-treatment when an accident has occurred, such as a bad extraction, a blow or a fall, or if there is inflammation and septic absorption. Phosphorus necrosis may be prevented by great care of the mouth and the stopping of all carious teeth.

To prevent the falling in of the soft parts after extensive necrosis, dental plates should be used.

For the prophylaxis of noma, see the section on children's diseases—also for thrush and aphthous stomatitis.

The prophylaxis of mercurial stomatitis, which may affect workmen who employ mercury and syphilitic patients who take mercury, is as follows :—

Before the commencement of mercurial treatment the patient's gums and buccal mucous membrane should be hardened by the use of astringent mouthwashes. The teeth should be stopped, points and sharp edges ground down and the tartar removed, to prevent lesions of the mucous membrane. If there are already lesions, they should be healed by touching with hydrobromic acid, nitrate of silver, or a five to ten per cent. solution of chromic acid, so that ulceration may be prevented. Professor Jadassohn found that washing out with a two to five per cent. hydrogen peroxide was a preventive. Moreover he first touches the ulcerating surfaces with a ten per cent. solution of chromic acid and directly afterwards with nitrate of silver, by which red silver chromate is formed.

The method is said to be but slightly painful and the ulcers quickly heal.

Prophylactic care of the mouth is still far too little heeded in hospitals, and it were much to be desired that a dentist should be appointed to hospitals. During treatment, care of the mouth and teeth is urgently needed. A two or three per cent. solution of potassium chlorate is the best mouth-wash and is to be preferred to potassium permanganate,

salicyl, or corrosive sublimate. If the gum is already loosened, an attempt must be made by touching the parts with the substances above mentioned. If these fail, we may try dabbing with a solution of methylene blue followed by copious rinsing with water.

Lastly reference must be made to the prophylactic value of plates for covering loss of substance after injuries and after removal of parts.

They are chiefly to replace the lower jaw, and thus to prevent the serious dangers which may follow extensive resection. The deformity and the interference with mastication, swallowing and speech, can in very few cases indeed be prevented by operation, but require the help of the dentist.

To the question, When is the plate to be used, at once or after healing? one must reply that it should be used immediately.

If we wait till healing has taken place, it then requires a tedious stretching of the scar tissue and replacement of the parts concerned before the plate can be applied, but immediate interposition not only prevents contraction of the soft parts which have been deprived of their support, but does not essentially hinder, except at first, mastication, speech and swallowing.

A trial plate should first be made. To do this an impression is taken before the resection of the jaw, from this model a piece is cut out similar to the piece to be resected, and the piece to be inserted is made according to this. This must be so arranged that it allows of a perfect view of the condition of the wound and does not cover the wound surface. Metal (gold, platinum, or steel covered with tin) must be used for the material, and this plate, the "primary jaw splint," must be constructed of wire to prevent retention of secretion. The object of this splint is to keep the rest of the jaw in its normal position while the wound is healing. It is fastened with screws to the bones, so that with the necessary disinfection there is no hindrance to healing. It must be worn during the whole time that the scar is forming, and it has the further advan-

tage of giving a firm hold for the iodoform gauze plug. As soon the condition of the wound allows it, a permanent plate is made consisting mainly of hard caoutchouc.

The precautions mentioned here are also in a sense applicable for plates after other operations.

The making of artificial noses and of other parts of the face to improve the appearance after loss of the part, and also of obturators for the palate and support for a nose which has fallen in, is also sometimes included in the work of the dentist.

The Prevention of the Diseases of the Throat and Nose

BY

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OF BERLIN

799

The Prevention of the Diseases of the Throat and Nose

I. General Prophylaxis

If we would rationally prevent disease of the organ of voice and of speech, we must restrict the demands made upon this organ in its various physiological functions to the range within which the study of its hygiene shows it to be capable of working. This hygiene is applied physiology, and its special use will depend upon a medical knowledge of the individual strength and predisposition. When its professional use enters into the question, we have also to consider the kind and amount of technical training required for the work which is to be done.

Further our experience of certain diseases, both constitutional and loacl, shows that they have a predilection to attack this part. To cure or prevent the general or primary trouble means often the prevention of the secondary disease. Where this is not possible or is no longer possible, our efforts to prevent disease must naturally be restricted to protecting the organ against the disease with which it is threatened.

The following plan of dealing with the subject naturally suggests itself. First, we have to consider the physiological functions of the naso-pharynx and larynx and the end organs of sense found in them, so far as it is possible to treat any limitations of their functions and thus prevent permanent injury. Next, we shall consider the most important constitutional and local diseases of neighbouring parts in their relation to these functions, such as syphilis, tuberculosis,

lupus, leprosy and diphtheria. Among diseases of neighbouring organs we must consider diseases of the organ of hearing, of the eyes, of the teeth, and of the accessory nasal cavities. Lastly we shall have to consider the interrelation of diseases affecting these regions—the extension of disease of the larynx to the throat and nose, and conversely the results to the accessory nasal cavities which may follow the existence of disease of the nose and throat.

Accordingly the first group of preventive measures to be discussed would essentially be those directed against conditions and processes which check functional activity.

To commence with the nasal cavity itself, a prophylaxis against the functional limitations would have to be regarded from three aspects corresponding with the three chief functions of this part—respiration, speech and smell.

We cannot however group these together for consideration because they neither rest upon the same basis clinically, nor are they equally significant in the hygiene of the individual. In this connection we need only point out how serious would be the result of the loss, complete or partial, of the sense of smell in a cook. On the other hand, a slight alteration in the voice of a cook might be scarcely noticed by him, though a similar change in the voice of a singer or a tragedian might make him completely unfit for his profession. Considered from this aspect, prophylactic measures would not be the same; the significance would be different for each individual, and individual treatment would be required.

PROPHYLAXIS FOR LIMITATIONS IN THE POWER OF BREATHING AND SMELL.

The limitations of breathing are put first because of their clinical importance and frequency. It is well known that every one of the common structural changes in the wall of the nose does not necessarily imply an obstruction to respiration any more than does every congestion of the mucous membrane of the turbinate bone. The functional diagnosis that such changes are present should first be made before we attempt to treat locally a region which is so

varied in its structure. It is not within the scope of a work on prophylaxis to enter into further details about this. On the other hand, we must not evade what clinical observation and pathology in common teach. Thus we find there are two main causes of obstruction to respiration in adults, with their sequelae, which result from diminution of the capacity to remove dust from the air, to make it moist and to warm it before it passes to the lungs. One of these two causes is venous obstruction. Mechanical obstructions of various kinds permanently hinder the efficient removal of venous blood from the plexuses in the mucous membrane and submucous layers. If these obstructions cannot be removed as in diseases of the organs of circulation, of the kidneys and liver, prophylactic measures must be restricted to an endeavour to aid and maintain the natural conpensation which the history of the clinical course of these diseases shows to be possible. But if they are curable, then prophylaxis is as it were the ideal treatment. The perception of this connection is the duty of the physician and guards him against the routine local "treatment" of the routine doctor. Every one who has to treat a large number of patients belonging to the richer classes, will bear me out when I say that their unhygienic life finds its most frequent expression in chronic constipation. One cannot in every case lay the blame on the luxurious social life of these classes; in some cases, although a minority, it is the result of too severe or prolonged mental activity and neglect of the body and of muscular activity, in a word, a sedentary life.

In all these cases, besides many other symptoms of obstruction, we find chronic "relaxation" of the mucous membrane over the turbinate bones; the degree of obstruction to nasal respiration associated with it depends upon the amount of the mechanical obstruction in the respiratory nasal passage. Thus a comparatively slight swelling of the part near the middle turbinate bone may give rise to far greater trouble than a greater affection of the lower nasal canal, which does not interfere with the respiratory passage. In addition to this mechanical obstruction, which is met

with in the more permanent conditions, two other factors must be taken into account.

First, the length of time it has taken to develop. Here, as elsewhere, the narrowing of a passage which occurs gradually is better borne than that which sets in more suddenly and develops rapidly. Next, we have to take into account the kind of swelling which affects the mucous membrane; that is to say, in addition to the amount of the mechanical obstruction, we have to consider what is the cause of it, whether some circulatory disturbance or general nervous exhaustion is the cause of the abnormal swollen condition which gives rise to the obstruction. Thus, the sudden appearance of constriction and occlusion in a case where the respiration was previously free, may lead to a diagnosis when the local examination is negative. In other cases we find a mixed transitional state, where some sudden obstruction is engrafted by chance upon some permanent condition which has already impeded respiration.

In other cases there is no mechanical obstruction of the respiratory passage due to venous obstruction which has become permanent, but there is a characteristic abnormal predisposition to disease, to acute rhinitis. Repeated slight attacks, with occasional more severe attacks of inflammation follow one another at intervals, which become shorter and shorter, till finally the least draught or the most trivial wetting or chill of the skin of some remote part of the body, suffices to produce the disease, or to aggravate a subacute or chronic inflammatory condition. In such patients this condition arises, though there is no impeded circulation. The chronic changes which are found are rather the remnants of inflammatory processes which have never perfectly subsided. In children, the inadequacy of nasal respiration is in the majority of cases of very different origin from that in adults. Although an unhygienic life and improper food are the cause of a certain number of cases in childhood, yet these are comparatively few compared with the large number of cases where there is chronic disease of the pharyngeal adenoid tissue, which has been left after acute infectious

diseases in youth. Measles, scarlet fever, and diphtheria are the chief causes. But even in the small minority of cases where the cause of the disease corresponds largely with the cause of it in adults, there is nevertheless this important difference, that in addition to, and probably because of the changes in the mucous lining itself, a mass of adenoid growths appears.

If now, having regard to what has just been said, we attempt to sketch out the prophylactic measures that are available, these will fall under two categories. Of these two categories, the one comprises social and individual hygienic measures, the other comprises those which the physician himself must carry out. For the former, he relies upon the goodwill sometimes of the patient, sometimes of the heads of a business firm, or other authority. Thus in factories and in schools, those who are at the head of these establishments are the authorities in all that refers to trade hygiene, and to most questions of school hygiene. But, as we shall soon see, it does not do to leave prophylactic measures to the well-meant advice of the physician in the consulting room alone. The work is only half done and the treatment inefficient if I try to cure a child which is suffering from recurrent tracheal catarrh, by local treatment and drugs, and then find out by chance that he is next a child at school who has whooping cough. It is just as useless and incorrect to treat the local changes in the nasal cavity of one who works with plaster of paris, or of a clothworker, when there are no protective screens and safeguards in the workshop, to make the work of filtration of the air easier for the upper respiratory passages. While we gratefully acknowledge that in the factory and school there is the commencement of a promising movement which may eventually lead to the dissemination of the most important hygienic rules, yet we know on the other hand how great is the neglect of hygiene in offices and workrooms where there is no supervision, and in private schools where there is far too little supervision. An over-heated dry atmosphere, defective ventilation, uncomfortable postures in sitting

and in writing, unhealthy or badly adapted illumination, are a danger to the upper respiratory passage and to the eyes, just as the continual din of very noisy typewriters, placed side by side, threaten the organ of hearing and the whole nervous system. I have seen badly adapted miserably small rooms in which there were six to eight of these machines. The noise of the typewriters, the heated and bad air, and the dust, made the whole look very similar to the condition of factories before the introduction of the first hygienic regulations for trades. The worst and smallest rooms of a private house are not seldom fitted up for such purposes, and there is at present no supervision whatever of these work places. Only ten years ago I saw in Berlin a school which was recommended by the director of a public school, because his own classes were too full. It was situated in a tenement house of the worst kind in Berlin. The "classes" were held, some in the kitchen, others in the musty bedroom of the schoolmaster. The least said about the school benches the better. Most of the boys sat upon ordinary chairs at a high round dining table, which in the daytime was lighted by an oil lamp, while the rest lay in mystical obscurity.

In every case the physician must not forget to enquire into the particular arrangements for hygiene in the occupations of adults, and of the school in the case of school children, to determine how far these have contributed to cause or keep up any local changes in the upper air passages. In this way alone can the prophylactic measures be placed upon a sure footing, and the carrying out of them will be incumbent on the physician, some of them being already included in the domain of treatment. These measures can obviously not be represented merely by local treatment. On the contrary, in regard to what has been said above, the conscientious physician will often have to refuse to give local treatment. He will even sometimes have to undeceive and surprise patients who see him making other examinations and asking other questions than they had expected. This is often my experience when, after making a rhinoscopic examination of the apparently diseased nose, I

do not proceed to cauterize or to paint it, but examine the chest and digestive organs. With the threatened specialization of medical work and treatment, we have long had even among the better educated a mechanical conception of independent organic diseases, and corresponding specialistic treatment of organs. This is well shown by the naïve astonishment of those patients at the thought that their haemorrhoids or constipation have any relation to their nasal or laryngeal trouble. Sooner than believe this, they fall back upon the favourite idea that a cold is the cause, although there is not the least logical reason for it.

It is very difficult to conceive why these people are content half their lives to ascribe to a cold the causation of their disease, attributing each of their numerous attacks to some trivial exciting cause, instead of really finding out what is the reason for this predisposition to cold. Generally the whole disease is caused by a very unhygienic or irrational way of life; it rests upon physical effeminacy and neglect of the skin. Instead of a sensible hardening of the body, there is anxiety to avoid every breath of air; instead of muscular exercise and action on the skin suitable to the individual, we find coddling, "rest," and improper or excessive food, and a sedentary mode of life. Prophylaxis must prevent the development of such morbid congestions and this condition of excessive irritability, for that process which is often regarded as dependent upon infection will find no entry through healthy resistant skin and mucous membrane.

Then the work of medical prophylaxis is essentially dietetic and gymnastic in the widest sense of these words. Not the routine prescribing of purgative and massage, but a carefully selected and conscientiously supervised personal treatment and care can really be regarded as a preventive of the local disease, and it may make local treatment quite unnecessary, or if the latter be indispensable will render it successful. The duty of the physician as regards prophylaxis is somewhat different when treating children and youths. Here obviously dietetic and gymnastic treatment is

just as useful as in adults, when the processes and conditions are similar. But in the convalescent stage in children special attention should be directed to the upper air passages and their vicinity. Just as disease of the adenoid tissue appears prior to or during the early stage of convalescence, so also do we find that suppuration of neighbouring bony cavities develops at this period. Not seldom they escape the notice of the physician who is treating the case. And yet the irritating effect of the secretions met with in these diseases may prevent the mucous membrane from being restored to its normal condition although there is no stagnation. Slight reflection will show how important it is in these little patients to recognize the presence of such disease as soon as possible. In a large number of these cases the suppurative processes heal without any surgical interference. Recovery can be best promoted by providing a free passage for the pus, and by removing any masses of secretion or swelling which are obstructing the flow. When it has not been possible to prevent this by prophylactic treatment, and there is chronic suppuration in the accessory cavities, then early recognition and cure of the condition will prevent further trouble. Threatened meningitis, the most serious result of the extension and spread of persisting disease of the accessory cavities, may be best and most surely prevented by treating the disease from the very commencement, and thus preventing any ill effects.

When disease of the pharyngeal adenoid tissue has developed after acute infectious diseases, local surgical treatment is required in a very large number of cases. When there is much nasal obstruction one hardly feels inclined to wait and see what will be the result wrought by weeks and months of general tonic treatment—and the usual course is to remove the adenoids by local treatment as a preliminary stage to general dietetic measures and respiratory exercises. But these respiratory exercises must not be neglected, neither should it be forgotten that in many cases the interference with respiration is very slight and not constant. In these cases, if the child is anaemic, weakly

and also very young, general treatment should first be adopted. If local interference is postponed in these cases, we often find that general tonic, dietetic and gymnastic treatment suffices to cure the local trouble. Such treatment belongs therefore also to prophylaxis. The fact that there are adenoids does not necessarily imply that their removal is indicated, but in each individual case we must consider carefully whether operative interference is really necessary. Treatment should not—as is so apt to be the case in special hospitals—be restricted to removal of the adenoids; still less should the aim be to remove every particle of tissue as is sometimes recommended and in vain attempted. Some technical detail in the operation is sometimes relied upon as certain to prevent recurrence, but we would therefore, on the contrary, point out the great importance and value of general treatment. This offers, in my opinion, the surest method of preventing fresh disease. For many years I have recommended for after treatment, systematic respiratory exercises, with and without apparatus, in addition to general tonic and dietetic measures. Among apparatus, I find Hildburghauser's "rowing machine" very serviceable.

PROPHYLAXIS FOR IMPAIRMENT OF VOICE.

We are often asked for medical prophylaxis in this connection by patients whose calling necessitates much use of the voice. The impairment generally felt by the patient is a difficulty in nasal resonance; the voice does not sound as before, it does not carry so far. This must not be confused with that other equally common complaint that a feeling of tiredness, mostly laryngeal, is soon felt; although we sometimes find that the impairment which has been mentioned leads to special efforts to phonate and finally to shouting, which may produce exhaustion of the apparatus for phonation.

And here we may at once say that in our schools far too little is still done to instruct pupils in the art of speaking.

He who draws comparisons between Germany and other countries will see how far ahead of us most of our neighbours are, not only in the art of speaking extempore, but also, if I may so term it, in the essential technics of speech. Many of our young people have never even got over the simplest disturbances of embarrassment; they stammer and stutter, they breathe badly and talk far too quickly. And when, without previous exercise, they are obliged to use their voice and speech in their vocation, they tire and soon show signs of exhaustion. The schools might help much, and, at least, it is the duty of colleges to teach and practise these future teachers, preachers, politicians, and officers more in the art of speaking than is the case.

The hygiene of speech and the aesthetics of speaking are equally important parts of the same branch of education. According to my own observations, which are fairly extensive, the disturbances of the voice among singers and those of the other occupations mentioned above, of which there is a large and constantly increasing number of cases, will be reduced when greater value is attached to the technical side of extempore speaking in schools and to practical and theoretical training in the technics of speaking.

The prophylaxis of early exhaustion of the larynx is most important for all who have to use the voice professionally. Not only singers, but orators, actors, officers, and preachers form a contingent of the great army of those who, as the result of wrong use of the organs of speech, are liable to find themselves unfitted for their work. This wrong treatment need not necessarily rest on any wrong management of the voice in the beginning. It may be caused by excessive use; and it is worthy of mention that the results of the mere physical overstrain by hours of consecutive speaking in many professions are not known and taken into consideration. Actors, singers, and some speakers are in the habit of carefully training and practising before undertaking anything which requires great exertion; moreover most of those who follow these professions have had years of previous practice. On the other hand, it has often ex-

cited my astonishment to see with how little care school teachers are prepared for their work. To give lectures two and even three hours in succession, and this several times a day, is not a rare occurrence in the teacher's work; very often those who overtask themselves thus are weakly, and often the atmosphere is unhealthy. Evil results generally follow. The vocal apparatus of singers will react minutely to every misuse. The artistic musical requirements demanded of the trained singer most quickly show every defect, every backward step. During the period of his training they are also evident enough. The chief symptoms of all conditions of laryngeal exhaustion which then occur are a feeling of tiredness after very little work and the various forms of disturbed sensation that are apt to accompany disease and exhaustion of the upper air-passages. When there is no perceptible mechanical cause to be discovered, the chief cause is a wrong method of tone-production taught by bad teachers or acquired by over-strain, which manifests itself acoustically as a disturbance in intonation first affecting its purity and then its intensity.

I have shown that it will be a serious matter if these early forms of vocal disturbance are unrecognized or unnoticed; I have described the early symptoms exactly and shown that they lead insidiously and gradually to graver defects which mean indeed the loss of the voice for singing. The disturbances of the speaking voice which hinder its activity as required by the orator or actor, by the preacher or officer, give rise *mutatis mutandis* to similar signs of exhaustion and inability to do the desired work. They are generally not recognized till later, but are open to the same means of diagnosis and of treatment. Acting upon the assumption that one who can detect a slight disturbance will not fail to detect a greater one, I will give a few brief statements upon this subject, which relate to the early forms of laryngeal vocal disturbance in singers. These will also be useful, I think, when describing the general prophylactic measures available. The nature of the disturbances in intonation with which we must begin consists in

this—that when the accustomed nervous impulse is set in motion, which should with a certain position, and tension of the vocal cords and a certain current of breath clearly produce the desired tone, a difference is perceptible between the tone emitted and that which was desired. To take a typical case as an example, we will assume—and it is very common—that the disturbance is only an acoustic one, moreover that it is only perceptible at one or two limited places in the range of the voice when the sound is weak, and that the sound emitted is deeper than was wished. From these preliminary statements—which as I need scarcely say are the outcome of the examination of many individual cases—the attentive reader will be able to derive many useful hints about doubtful and questionable points. The next point to be considered is that such a slight functional disturbance is evident also to other musical ears, and above all to the singing master; then we shall consider how far the recognition of commencing disturbance in intonation is a sign that medical aid should be sought.

My experience is that the trained, educated singer does not fail to notice these disturbances in intonation in their earliest form; but that most teachers of singing seem not to understand and recognize this stage. In very many cases I have found, alas, that when the pupil has mentioned the matter to his singing master he has been advised to continue with his singing. Then the further course of the vocal disturbance is generally this—that the original disturbance in intonation which affected only parts of the range of the voice extends, until in advanced cases the entire compass of the voice may at last be affected. Further, we find that the disturbance affects no longer only the commencement of intonation and the weaker sounds, but that the whole period of intonation and all sounds are false.

How is this to be explained? The educated trained singer has the power of always emitting the intended tone at a certain pitch, with the same intensity and the same degree of vibration of the cords; for this, in addition to

the ordinary methods of giving colour to tone, he resorts to a number of shades of tone which are produced by calling into use the tensors and adductors in other than their usual relation to their antagonists. The extreme limits of these possibilities, which we call physiological for the voice, are not recognized in singing. They lead from the ideal minimum of tension and adduction of the vocal cords gradually to that degree of relaxation which permits only a whisper; on the other side, they can reach to that maximum of tension and adduction which characterizes the position of occlusion.

Every singer knows and can control the various methods of emitting sound, of the same pitch and same rate of vibration, so as to maintain at a certain intensity a pure sound.

The first indication of the disturbance in intonation with which we are here concerned is almost invariably that this power is lost for certain parts of the compass, and those tones can only then be produced with a relatively increased tension and adduction. This may usually be regarded as the effect of the increased effort which had to be made, though possibly only for a brief interval, in order to overcome some mechanical obstruction; that is to say, the man has sung, although there was catarrh of the larynx, with slight mechanical changes, and these changes were such that the ordinary effort of the tensors and adductors relatively to their antagonists no longer sufficed for the work. It is astonishing how quickly insufficiency then appears, especially in those highest accomplishments which have been acquired by long training and always at the same place in the compass. It is always the highest tones and the transitions which are first affected in these disturbances, and thus we always notice first that the power of holding on to a pure sound begins to be lost. If the attempt is made, we hear regularly in recent and slight cases a lower sound than was intended. I said above that most singers are well able to detect the commencement of this disturbance; their correct musical ear makes them aware of this functional disturbance from the very begin-

ning, while the appreciation of the movements of the vocal cords acquired by long practice is obviously lost very soon after the disturbance of intonation sets in. Consequently if this signal given by the ear is neglected through the patient's own folly or through the ignorance of the teacher, an incurable habit in intonation is formed, and this false intonation will come to be felt as correct, just as a pianist who, compelled constantly to play upon a piano which is out of tune, acquiesces at last in false tones which at first would have driven him to desperation.

The loss of the idea of the movements of the cords and the fact that the power of controlling sounds by the ear becomes weakened, affords part of the explanation why disturbances in intonation develop so very rapidly and are so persistent. The other part of the explanation is to be found in the symptoms of early fatigue caused by continual excessive use of the tensors and adductors in singing. The more the patient sings the more rapidly and early will symptoms of fatigue and exhaustion set in, and the more rapid and extensive will be the progress of the muscular inefficiency over the greater parts of the range of the voice. In the oldest and most severe cases of this kind we find at those places of the range first affected, that the attempt to commence the tone is a complete failure, a stage of waste of breath, and is followed later by a tone which is markedly lowered. But this serious laryngeal loss of power may only be noticeable when the attempt to sing is made, it does not affect the speaking voice ; neither does a laryngoscopic examination show any disturbances of mobility which would explain the serious functional disturbance in the singing voice.

Whenever the disturbance has progressed thus far, it falls in reality under the subject of loss of voice ; this is certainly the case when the loss no longer affects only isolated tones but a fairly large part of the vocal range. In reality, every diffuse disturbance in intonation which is the result of a chronic insufficiency of the laryngeal muscles will certainly sooner or later lead to loss of the

singing voice, and this will be the more rapid, the more zealously singing is continued during this stage. It is not for me here to consider the clinical aspect of these disturbances in intonation as thoroughly as the importance and nature of this loss of power of singing would demand. I can therefore only briefly point out that it is accompanied not seldom by other disturbances in the singing voice from the very beginning, and that in the course of what was first an isolated disturbance in intonation, other disturbances may arise. From what has been said it will be evident that when cure of the disease is possible, it will be the more easily and rapidly cured the earlier the treatment is commenced.

The two chief principles of individual prophylaxis will be easily understood after the above description of these disturbances. The organ must only by suitable training be gradually fitted for the more difficult and greater demands upon it; and if disturbances arise which make easy and effortless phonation impossible or difficult, the demands made upon the voice must be correspondingly reduced or altogether given up.

All this seems very simple and self-evident. But there are no hygienic rules so much neglected as are these. In the works on voice production, written by authorities on the subject, the complaint is constantly made that no other subject is taught by so many unqualified instructors. It has been said that most singing masters think that the majority of singing masters are of no use, and they are, alas! right. But we must not forget that the few exceptions stand out the more conspicuously and have done excellent work; and from these laryngologists can and should learn very much. On the other hand, laryngologists are in a better position to know what great and untold harm is caused by incapable teachers, because often they are the next to whom these unfortunate victims go. The best prophylactic measure would be a regulation requiring all persons who desire to teach voice production to have some certificate from the State to show that they are capable. In so very important and responsible a calling as that of

the professional training of the voice, teachers are allowed to work in ignorance. How very different it would be if some amount of knowledge of voice hygiene and physiology were required of all instructors in singing. And singers, actors and orators would not risk their voice and future career, as so often happens, did they possess a general knowledge of the structure of the vocal apparatus and of the hygiene of the voice. How often we hear a hoarse singer worrying himself and his audience for a whole evening, and how little regard the stage manager shows towards his artistes. A certificate of fitness should therefore be demanded from those who teach and the pupils should be taught how to treat the organ of voice in singing and in speaking, so that they may at least be protected against the most serious results of misuse of the voice.

Before leaving these simple inflammatory processes and passing on to the prophylaxis of constitutional disease, we have still to consider a few special forms of disease which have this in common with the previous ones, that their local treatment becomes the more difficult and more unfavourable the longer it is postponed. There are first the processes which an examination reveals, such as atrophy of the mucous membrane. Probably these include several different pathological and anatomical processes which do not come under examination at their commencement, and whose nature is still obscure in spite of numerous attempts to explain them. We find also in the nose more or less advanced rarefaction of the deeper structure of the wall and of the bony structure of the turbinates. The best known is atrophic rhinitis or ozaena.[1] I incline to the

[1] Since Stoerk drew attention to it, the suspicion has often been repeated that "ozaena" is of syphilitic nature or at least a residual form of an earlier syphilitic process. But when we remember that there is scarcely any illness whose aetiology is obscure where we do not suspect such a "connection," and when we know that the disease is quite uninfluenced by antisyphilitic treatment, then these conjectures do not concern us much in our therapeutic and prophylactic efforts. True nasal syphilis is, naturally, not included in these remarks.

opinion that the recognition of the earlier stages will be most likely to render it possible to employ prophylactic measures. In that way our endeavours to effect a real cure by local and dietetic treatment will be crowned with success. In these cases, where the mischief is recent, the patient young and the general treatment energetic, comparatively simple methods of local treatment will suffice. Simple irrigations and painting, together with massage and the administration of mild iodine preparations, may suffice and effect a permanent cure in a few months, where later and more unfavourable conditions might require more severe methods for a longer time. Among the most effectual factors in general treatment, we must not forget sea air and sea baths. Catti is of opinion that the basis of the development of ozaena is the involvement of the nose in acute infective diseases. He considers that many an ozaena might be prevented if, for example, scarlatinal rhinitis were diagnosed and treated as early as possible.

In many cases we meet with patients who have for years been treated for pharyngitis and laryngitis but without success. Many of these patients owe their throat trouble to some affection of the nose which hinders nasal respiration. No matter whether secondary irritation or chronic catarrhal processes have developed in the deeper parts or not, the recognition and cure of the primary nasal trouble is the appropriate treatment for the secondary disease and irritation.

We must never, as was formerly often the case before the nasal cavity was so well investigated as now, rest content with the mere observation and treatment of the deeper parts. Many a "pharyngitis" which had long resisted all applications and gargles disappeared of itself where the nasal respiration was made free. The mere local treatment of the primary nasal trouble, as was before stated, is not all. Rather must we find out the special cause of it and adopt general treatment which is suitable.

As a curiosity I must mention a local prophylactic which the patients often themselves adopt to prevent the dreaded

return of rhinitis. This consists in the regular use of nasal douches and similar irrigations, much prescribed also by hydropathists, who are now so much in favour. We are often told after a time, when for any reason we have been obliged to apply some local treatment, that the patient has made use of this method—now, unfortunately, so popular—for many years. In other cases, complaints are made of all sorts of conditions of irritation for which, after the most careful examination, we can find no cause. Since my attention was drawn to it, I now always ask these patients about nasal douching—and not at all rarely I find that with the discontinuance of this superfluous irritation all the troubles disappear leaving no trace behind them.

The frequent cases of acquired adhesions in the upper air-passages draw our attention to those forms which are the result of medical interference, and might consequently in a certain number of cases be prevented. It must be granted that in some cases the deformity has been caused because the patient has not carried out the after-treatment. If they are early told what will be the consequences of such neglect, the physician cannot be held responsible. But I have also seen and occasionally described very serious cases where extensive intranasal adhesions have arisen through treatment with caustics. Prophylaxis consists in this, that we must carefully avoid applications to surfaces which lie against adjacent parts of the wall. Special care must be observed in applying the galvano-cautery, so as to form wounds, when at the same time there is some thickening, distortion or outgrowth of the septum which makes the introduction and application of the galvano-cautery difficult. In comparison with these acquired intranasal deformities, similar throat deformities are rarely seen, although in the removal of enlarged pharyngeal tonsils and adenoid growths, some injury to the hinder surface of the soft palate is probably sometimes inflicted. Evidently the mobility of this part and the position which it mostly assumes in the upper part of the naso-pharynx away from the posterior wall are not favour-

able to adhesion. However, in the removal of adenoid growths by an instrument, I would advise that the soft palate be protected by a palate retractor. After repeated and somewhat too extensive treatment of the tonsillar region with the galvano-cautery, we sometimes see adhesions between the posterior pillar of the fauces and the posterior pharyngeal wall, where it may set up very active irritation.

The danger in operations on the larynx of causing adhesions is the greater, the nearer they are to the anterior commissure, and the more symmetrical the operation wounds are if made at the same time or at very short intervals. After the removal of broad-based tumours cicatrices may form partly occluding the larynx. If they are narrow in the sagittal diameter, they are of course without significance, but directly they offer any impediment to respiration, an attempt must be made to remove them, and this is not always easy as it often requires very careful and prolonged after-treatment to prevent them from growing again. On the other hand it is obvious that such partial deformities cannot always be prevented.

II. Special Prophylaxis

Rhinological and laryngological prophylaxis in acute infectious diseases in children and young people consists partly in the care and appropriate treatment of the patient himself, but in severe cases of the disease or in an epidemic, it may be of greater importance to order protective measures for those around the patient. In all these diseases it is almost equally important, before there is any disease, to adopt general measures to protect this important region of the upper respiratory passage from lesions and disease in the same way as we endeavour to raise the power of resistance of the individual. Among these must be included the prevention of the numerous small injuries to which the entrance to the nostril and the septum, where they can be reached by the finger, are especially ex-

posed. It is not always simply the bad habits of children with which we have to contend. Careful examination often shows either some remote cause (irritation of worms) or some local cause. Among these are foreign bodies, eczema and troublesome accumulations of secretion. Experience shows that even in the febrile stage of many children's diseases there is considerable swelling of the adenoid tissue in the throat, therefore while the child is still well this condition should receive attention, the more so when some obstruction to breathing or swallowing is caused thereby; for when some serious disease sets in, this may become the more dangerous because swelling and disease affecting the deeper parts add to the obstruction to respiration, and hinder nutrition, even if the child be not less capable of resisting the acute infective process because it breathes badly and is ill-nourished. Moreover, the care of the mouth and a good condition of the teeth are important in connection with all infective diseases. Much more ought to be done for the poorer and middle classes in this matter. The dental department of hospitals should have means to enable them to adopt conservative treatment for their patients, gratis, and workpeople should be continually instructed about the great significance of early treatment of the teeth.

These prophylactic measures are the more important in connection with the nose and larynx, because any adequate local treatment during the acme of febrile diseases is impossible. The most we can then do is to observe and check the morbid processes, and if we decide upon any local treatment, this must be very cautiously carried out, and cannot comprise more than a cleansing of the part attacked or purely palliative treatment.

The following remarks about the various infective diseases cannot claim and are not intended to be exhaustive; many points about these diseases are omitted, because with the exception of the preventive measures described above, while the individual is still well, nothing or next to nothing can be done when the disease has once set in.

Erysipelas serves as a type. There we can most clearly see

in which direction prophylaxis is possible: the aim must be to keep the mucous membrane and apertures healthy and the teeth sound. If the patient has previously had an attack, greater care should be taken to remove all causes which might produce small lesions in the situations mentioned. But we must also caution one who is prone to erysipelas to be very careful to wash and disinfect his hands, especially when there is any irritation at the inlets to the upper respiratory passage, which might lead him to touch, rub or scratch them.

When erysipelas has once developed, very little can be done. It is always well, in order to protect the individual from subsequent attacks, to find out the point at which an entrance was effected. The direction in which it spreads may give a clue. It may begin as a cutaneous erysipelas which then spreads to neighbouring mucous surfaces. Or, conversely, the disease may begin as a nasal, pharyngeal or laryngeal erysipelas and then secondarily affect the skin. Lastly, it is important, in regard to prophylaxis, to know that occasionally erysipelas may be caused from within through some suppurating focus; this will indicate the direction which preventive treatment must follow, when the acute symptoms are over and examination has shown how the process developed.

Another though less common disease in which preventive measures are the best treatment for the disease is glanders. Fortunately the predisposition to this disease in man is not great. The prognosis for this disease in man is bad, both in the acute form and in the more chronic. Those who have the care of horses should be carefully instructed in the importance of the disease, the more so, as they are men whose ignorance tends to make them underestimate the danger. There is the additional fact, as Landgraf points out, that the disease in horses often runs an insidious and slow course which makes its recognition very difficult. According to Schneidemühl the disease is generally conveyed to man by the pus, blood or nasal secretion of animals which are ill or have died; small particles of these get into minute wounds of the skin or on to the conjunctiva or buccal

mucous membrane. Landgraf repeats the old advice, never to wipe away the nasal secretion of a horse with a handkerchief.

Involvement of the upper air-passages in measles in scarlatina, in typhoid and in influenza shows great variability. It depends on the one hand upon the special character of the epidemic, and on the other hand, probably upon individual factors, such as the condition and power of resistance in these parts before infection occurs. I may mention in connection with measles the peculiarity that in some epidemics the ear is involved. In other epidemics again, we find regularly during convalescence, disease of the lymphatic tissues, and in other epidemics, very little or none. Sometimes there is only very little new tissue in itself but it is superimposed upon already existing chronic hyperplasia.

In scarlatina too, as in all acute infective diseases, the treatment of the mouth and teeth and of all causes which obstruct nasal respiration is the best preventive, and is available while the individual is still in good health.

Locally, during the course of the disease all energetic treatment must be avoided; but the scarlatinal rhinitis or rhinopharyngitis must be carefully watched to prevent extension to neighbouring or to deeper parts and to alleviate the condition by early treatment. The accessory nasal cavities and the middle ear have first to be considered; but we must also bear in mind that retropharyngeal abscess is by no means a rare complication of scarlatina, and its early symptoms, stiffness in the neck and throat, pain on swallowing and a rise of the temperature may be easily overlooked. The palliative treatment of scarlatinal purulent rhinitis and pharyngitis consists in simple gargling, and washing out or spraying with a five to ten per cent. solution of hydrogen peroxide.

In typhoid fever, the milder cases in which the upper air-passages are involved are often overlooked and no harm results therefrom. Pharyngeal and laryngeal affections are more common in typhoid than are nasal complications.

But nasal haemorrhages may occasionally be very severe and require treatment. As to the cause, Landgraf agrees with Tissier in thinking that erosion and not congestion is the cause—an opinion which is important in deciding upon the prophylactic and curative treatment to be adopted. Typhoid and erysipelas, scarlatina and small pox belong to those diseases in which, if possible, examination of the throat is indicated to detect laryngeal complications, and it may sometimes be required up to the date of convalescence. Superficial lesions may give rise to no symptoms or their symptoms may be masked by others. Even severe perichondritis may escape detection through stupor and prostration, although generally these lesions show themselves by fairly sudden symptoms of laryngeal or tracheal obstruction.

When stridor sets in during an apparently favourable convalescence, accompanied by a feeling of great anxiety with inspiratory obstruction and dyspnoea, going on to cyanosis, it urgently needs relief, or death by asphyxia will result. Laryngoscopic examination may lead to prophylactic treatment which will save life, but it should not be forgotten that this method of examination does not always give us definite information about the intensity of the process—and that the prognosis in pharyngeal or laryngeal complications of typhoid must always be given very cautiously. In perichondritis in typhoid the prognosis is especially bad and there is no real prophylactic treatment; to prevent death from asphyxia, the indications are to open abscesses and to perform tracheotomy.

The most careful attention must therefore be given by the physician and by the nurses to prophylactic treatment both at the commencement and during the course of the disease. Most important is the regular and careful treatment of the mouth and teeth.

The involvement of the upper air-passages in influenza is so variable that in many cases the most careful examination reveals no changes in those parts, because each separate part of the respiratory tract, even the deep parts, may be affected independently of the others. On the other hand

serious changes in the upper air-passages may occur and the rhinitis may extend to the accessory nasal cavities. Perhaps the increase in chronic affections of the accessory nasal cavities after influenza epidemics depends partly upon some special conditions which are unknown to us; but we must remember that many of these diseases are overlooked in the acute stage because their symptoms, pains in the head, and purulent or muco-purulent discharge, are masked by the primary rhinitis and rhinopharyngitis, when the mirror is not used for examination. This non-recognition of the acute disease of the accessory nasal cavities at the commencement and during the course of influenza explains part of the great increase in chronic disease of the accessory nasal cavities which has been observed since the first influenza epidemic, and which has given rise to some of the worst and most tedious cases of purulent affections of these parts. Since experience shows that many of these diseases are really complications or extensions of the morbid conditions of the febrile stage, careful rhinoscopic and laryngoscopic examinations of the patient should be made, so far as the general condition of the patient admits of them. Elsewhere I have pointed out that this examination is as important as the physical examination of the chest and should go hand in hand with it. Obviously in the acute stage the nasal catarrh cannot be very thoroughly treated, and all irritation and transference of infective material must be avoided. As a prophylactic I regard treatment of the mouth by washing it out regularly after every meal and cleansing of the teeth as most useful from the beginning of the illness. If the accessory cavities are involved and the discharge is serous or mucous, we may wait. Even with suppuration, if the symptoms are not urgent enough to require active interference, we may wait for a time to see whether simple measures, and the provision of free drainage by removing any obstruction will suffice to bring about spontaneous cure in this acute stage. If it cannot be thus cured, the further measures required to prevent the

process from becoming chronic and setting up all kinds of irreparable damage are to expose fully the diseased part by operation as soon as the patient's general condition permits.

With the pathological knowledge of the present day and the advances made in treatment, the prophylaxis against diphtheria can be fairly concisely stated. For the protection of the healthy, immediate and strict isolation of the patient suffering from diphtheria is necessary, and of all who are suspected of having the disease. Isolation should be continued until examination shows that there are no more diphtheria bacilli present; afterwards the room should be thoroughly disinfected. Notification is essential for the carrying out of these measures. But we must not forget that this may very often be evaded if the present "nature-healing" is permitted to go on. I had an opportunity once of seeing what occurred when some children suspected of having diphtheria were treated by the parents by "natural" methods, without calling in any doctor. The hygienic conditions defy description.

This deficiency in the law should be made good. If these well meant and useful prophylactic regulations by our sanitary authorities are to be effectual, such evasion should be made more difficult than at present it is. I know there are difficulties in getting this carried out, but without any great infringement of personal rights the duty of notification might be extended in order that strict and immediate isolation may be secured even amongst those who do not call in a doctor. But many more places are needed than at present exist where bacteriological examinations can be quickly made to settle the diagnosis in doubtful cases, and these should be free of charge for all. The State must provide these additional means of diagnosis if those suspected of having diphtheria are also to be isolated.

The local treatment with antiseptics or caustics which was formerly used has largely been given up, to the advantage of the patient, now that the serum treatment is more frequently used. With this decrease of active

local treatment, severe intranasal adhesions have been much less common, those which are still met with are the result of ulcerative processes and cannot be prevented by prophylactic measures.

The prophylaxis of tuberculosis to which we must now turn our attention, might really have been mentioned when speaking of some of the acute infective diseases, namely those which are followed by a predisposition to tuberculous disease. Next to measles, we should have to mention influenza in this connection. And it is therefore the duty of the physician in charge constantly to use his eyes and his ears. When the signs of catarrh do not wholly clear up, or the patient has formerly suffered from tuberculosis, or there is a family or individual predisposition to it, we must watch the physical signs with increased care and early and frequently examine the sputum for bacilli.

The prophylaxis in tuberculous disease of the throat coincides within certain limits with the prophylaxis of tuberculosis in general. There are some cases of tuberculous disease in the upper air-passages, in which other organs may also be diseased though their clinical significance is less. Another group consists of those cases of tuberculous disease of the lungs where there are no obvious changes in the upper air-passages; here the object of prophylaxis is to protect these and so far as it is possible to render them more capable of resistance. The prophylactic treatment of tuberculosis can under present conditions only be partial, because it is not only a question of hygiene and medicine, but also a social question. Philanthropists will therefore welcome the fact that in recent years some eminent physicians, with power of organization, have inaugurated and inspired movements to provide sanatoria for the poor and those of small means where they can be cured, or at least be relieved. Rest and good nursing combined with suitable general and local treatment are there available, and these factors will do very much more good for these poor patients than a short stay in a warm climate, which is obtained under consider-

able difficulties, yet after it the patient is obliged to go back to the old conditions, for he generally has the idea that such a change of climate will "cure" him completely in four to six weeks.

We hope that the number of cases of late diagnosis of tuberculosis will become ever smaller. In clinical work there is seldom an opportunty of studying cases in the earliest stage that admits of diagnosis. Instruction should also be given about cases in which we must not wait for signs. It is not to the interest of our patients who are threatened with tuberculosis that we allow them to get ill before treating them. In these cases we ought to anticipate and carefully, gradually and scientifically draw upon our preventive means: air and diet, activity of the skin and muscles, exercises, games, sports adapted to the individual, and subsequently careful watching even for years. Those predisposed to tuberculosis should be strengthened, the weak narrow chest should be enlarged up to its normal so far as age still permits, catarrhs should be carefully watched and treated till completely well; these are the chief objects of this earliest, wisest and most successful prophylaxis.

The next stage is that where there are already signs of disease in the upper air-passages. The frequency with which the various parts are attacked increases as we pass downwards from the nose, and this is just the opposite of what takes place in the case of simple catarrh. This fact in my opinion tells on the whole against primary disease of the throat. But we should not be misled thereby, as so often is the case, and regard examination of the nose and naso-pharynx as superfluous, because the presence of chronic rhinitis and rhinopharyngitis may be of clinical value. And though obviously tubercle bacilli can be more easily removed from the nose and throat than from the larynx, yet most observers agree that the bacilli are more apt to settle at spots where there is chronic catarrh or frequent acute attacks. On the other hand when early symptoms are present, we must not over-value the laryngoscopic examination. I have shown that often the changes can-

not be detected by careful laryngoscopic examination because they are not sufficiently large to be seen; and further when a small localized change is regarded as an early stage, we must remember that deeper and more extensive changes may be present. Lastly it is doubtful whether miliary infiltration with or without obvious tuberculous changes, may not appear in the form of a persistent chronic catarrh, or nutritional disturbance in the mucous membrane. Observers long ago regarded it as an important sign of bad omen if in examining the throat they found well-marked anaemia of the mucous membrane of the throat, sharply limited by the anterior palatine arch. We find it not only in well advanced lung disease but sometimes also in early stages, and though I am far from regarding it as pathognomonic, yet it is a sign which may be of significance for prophylaxis. Equally significant are hyperaesthesia and pain localized in the pharynx and larynx.

The question whether in tuberculous lung affections it is possible by prophylactic measures to prevent laryngeal complications cannot be answered with certainty. This much is certain, that it is our duty to treat most carefully in these patients the very slightest catarrh, to which in others little attention would be paid. Persistent irritation in the pharynx, kept up by nasal obstruction, should be prevented by removing the obstruction. But I am not an advocate of any heroic measures or interference accompanied by haemorrhage, or of resection and similar operations on the septum and turbinate bones, such as I find to my astonishment to be a fairly common practice in some of the German sanatoria for the treatment of lung disease. These operations are not well borne by the patient, and I would recommend in preference, local applications, massage, electrolysis, and the galvano-cautery as less weakening. All these require to be carefully used by skilled hands. The recent enquiries and investigations into the subject of tonsillar tuberculosis do not, it seems to me, justify us in removing masses of hypertrophied lympathic tissues in tuberculous patients, unless they really obstruct respiration or hinder

nutrition by interfering with deglutition or reduce the patient's strength by becoming frequently inflamed. We cannot here enter into the much disputed question of the local treatment of laryngeal tuberculosis except in so far as is necessary for describing prophylaxis. In this connection I can speak favourably of prophylactic tracheotomy recommended by Moritz Schmidt. It may, I have found even in apparently desperate cases, not only save the patient from asphyxia, but by rest and shrinking of the infiltrated parts and greater ease in swallowing ensure a period of comparatively great improvement in health.

Local surgical treatment of the earliest forms of laryngeal tuberculosis would, if we were sure that it would prevent further development of the process, be extremely important in prophylaxis. But we can scarcely even hold out this promise; the method can only be tentative, and we have moreover to remember that we cannot be sufficiently sure, by laryngoscopic examination, what widespread miliary infection may perhaps be present in addition to the visible, localized infiltration. And further, in ineffectual endolaryngeal operations there is the danger that the operation itself may make the process more rapid if it is not sufficiently extensive, and may also cause a spreading of the disease. In superficial and extensive infiltration, I therefore recommend electrolysis to be tried. I must add that two years ago Schmidthuisen recommended the galvanocautery, and recorded a successful case where there had been extensive infiltration; he showed also a series of very useful spiral galvano-cauteries for the purpose. This led me to try the method for cases of early slight infiltration and small ulcers, using it as Schmidthuisen recommended; in some cases the local result was permanent and the patient's general condition much improved. In one case of improvement, the cure has lasted now for more than a year. During the whole time open air and dietetic treatment were also adopted, though without any change of locality. These measures alone had been employed without any benefit before the local treatment was tried, and it may therefore be said that in similar cases local treatment may be a valuable

factor for the prevention of extension of laryngeal tuberculosis.

Treatment with tuberculin has been given up probably by most physicians. My own experience both of the old and of the new preparations is such that I do not recommend its use as a preventive.

Wherever sick people regularly and permanently inhabit certain rooms, it has recently been shown to be necessary to adopt every hygienic measure in the arrangement of the rooms, in the care of the patients and in making all the secretions and excretions harmless. Similar prophylactic hygienic measures are now expected also in schools and in all institutions, where young people congregate together regularly and for long periods, and where, although they do not live together day and night as in hospitals and boarding schools, they are exposed to similar dangers. The danger may even be greater because in schools many a carrier of infection is smuggled in or admitted by mistake, and may be a source of danger to his neighbours. When school physicians are appointed to all schools, including the higher schools, they must be empowered to act not only in reference to the scholars, but also in reference to the teachers who are ill. I remember from my own school days a teacher who preferred sitting near the middle of the pupils, and who was extremely objectionable to us because he expectorated so much and so often in an unpleasant way. The expectoration of scholars and of teachers should be made innocuous. The spitting vessels should contain some water and should be made so that they cannot be upset or thrown over. Hugo Wolf suggests that children who have a cough and expectorate should be put in a corner seat and should have a spitting vessel beside them. These regulations should not apply to tuberculous children only; I have lately known of healthy and strong children suffering from bronchitis of a very striking and obstinate nature. Finally it was discovered that these children sat close to others who had chronic disease of the organs of respiration, or next to children convalescent after measles and some acute febrile disease of childhood, who still coughed and expectorated,

and had evidently not been kept long enough away from school. Every physician who has met with these cases will welcome the appointment of school physicians, because the prophylaxis of tuberculosis is both difficult and important. Care in cleanliness and ventilation, in diagnosing sick children, in permitting them to attend school, and in their supervision—all these become of the greatest importance when tuberculous children have to be dealt with. Often it will be difficult to do justice to the sick child and at the same time protect the healthy children. In this case we must decide on doing what will be best for the healthy.

The prophylaxis of syphilis has to be considered in two aspects; one is the prophylaxis of infection. The wish to be protected against infection is only as a rule thought of in connection with genital infection. But one must not forget that infection may be conveyed by utensils, and in eating and in washing, and by other objects to which the poison of syphilis clings. In this connection we are also specially interested with those cases of primary syphilis of these parts which are known to have been caused by dental instruments, and also by aural instruments, such as the Eustachian catheter. Among these, we find mostly primary affections of the nasopharynx; nasal examinations which are so common seem to have caused infection in very few cases only. Primary affections in the upper respiratory tract are often not recognized, especially in their rarer situations at the nares and deeper parts of the pharynx—they have also been found on the epiglottis. Early diagnosis is the best and most important prophylactic, for they are often first seen in the form of ulceration, and are often mistaken and wrongly treated. But like the corresponding genital forms, they often assume a phagedaemic character, and one tonsil may also be infected by the other. I described such a case where in a young girl a chancre appeared on the left tonsil. The tonsil was much enlarged and bluish-red, and on its anterior surface was an ulcer which spread towards the middle line and was surrounded by a ring of yellow-grey deposit, and in the

middle was brownish black. The condition had been pronounced to be diphtheria; a few days before the admission of the patient a similar swelling of the other tonsil appeared opposite to the sore on the first tonsil, and this already showed a similar deposit.

Secondary signs are also frequently mistaken. Syphilitic erythema of the nose and throat, and syphilitic tonsillitis are often taken for simple catarrhal symptoms; mucous tubercles are very seldom recognized when localized exclusively in the naso-pharynx and when there are not at the same time changes in the mucous membrane or in the skin, which are more visible. Mucous patches in the mouth may also be sometimes missed as they may be not very easily seen. According as the situation gets lower in the larynx, the tendency to the deeper destructive forms increases and the milder forms are rarer, yet the milder pharyngeal syphilides may sometimes extend to the larynx, and for this reason too, early diagnosis and treatment are important. During the first three years after infection, the upper respiratory tract should be thoroughly examined; according to Michelson, this is also the favourite period for the later syphilides of the mucous membrane. In fifty per cent. of the cases collected by him he found gummatous ulcerative rhinitis complicated with specific disease of the throat and naso-pharynx. The danger to life and health of this gummatous infiltration in the upper air-passages is not altogether unrecognized by the public now-a-days. Perichondritis and periostitis of the nasal septum, gumma of the turbinates, sequestra from the ethmoid bone, destruction of the hard or soft palate are among the most important. But gumma of the naso-pharynx also merits attention if irremediable mischief is to be prevented. Careful and thorough examination is required, although the symptoms are comparatively slight when the destruction is rapid and quickly affects the deeper parts. The most favourite places are the hinder surface of the soft palate, the neighbourhood of the Eustachian tube, and the posterior pharyngeal wall. Gummatous infiltration of the posterior surface of the soft

palate leads to perforation; the difficulties in deglutition and in speech which are caused thereby are the greater, the more extensive and the nearer the gummata are to the hard palate. It is extremely important in order to prevent these disturbances that the mischief should be early recognized. For although the ulceration may afterwards heal, perforation is left with difficulties in deglutition and in speech, and this will considerably curtail the enjoyment of life, especially in educated people, and we should not be content with such a result. Considering the uncertainty of the result of a staphyloraphy for syphilitic ulceration our duty is to tell the patient that it is an attempt to close the hole by operation, but that we cannot be certain beforehand about the result. Moreover, we must have as little strain as possible upon the stitches. I have shown in several cases how much better the chances of healing are for merely mechanical reasons, if the line of suture is everywhere in the horizontal direction. In adults, the disturbance in deglutition alone disappears at first if the operation is successful, and the nasal voice will need special instruction and exercise in speaking. But the disturbance in speech may be easily cured even when there is considerable shortening of the soft palate.

Another reason why prophylaxis requires early recognition and treatment of pharyngeal ulceration is, that there is a tendency for ulcers on the posterior pharyngeal wall to progress quickly in the direction of the cervical vertebræ, where they may cause periostitis and caries—and moreover there is a tendency to rapid and extensive adhesions when ulcerating surfaces come into contact; hence the danger of ulceration between the posterior surface of the velum and the posterior pharyngeal wall in the neighbourhood of the Eustachian tubes, and of the spread of ulceration in the mouth and pharynx and to the larynx. In other words, neglect and error in diagnosis lead to the most serious consequences in the region of the upper air-passages, because the most extensive destruction and malformations may be produced there. There is a very general complaint of physicians that patients with nasal

syphilis mostly come for treatment at so late a stage that there is advanced ulceration and loss of tissue has occurred, which cannot be restored, or only with difficulty; and however much we may feel inclined to lay the blame of this on the insidious onset of the disease and the very slight symptoms, our defective knowledge of pathology and the defective methods of examination also co-operate. Inefficient prophylaxis may also be due to the fact that the gummatous processes in the upper air-passages are frequently the earliest and, for a long time, the only signs of a recrudescent syphilis. If these are overlooked or not diagnosed, the opportunity may easily be missed of preventing the spread of syphilis to near or distant vital organs.

III. The Prophylaxis of Haemorrhages

The special consideration of one symptom which may proceed from very different causes is justified because at the moment when it appears, and therefore often at the moment of real danger, a certain number of cases require the same kind of treatment although we are unable to explain the aetiological connection. The real preventive treatment can often not be carried out till this dangerous symptom has subsided. Prophylaxis will be necessary to prevent recurrence, if possible by removing the known cause. When this is not possible, prophylaxis endeavours to protect the patient by telling him what he must do when haemorrhage recurs, to prevent the more serious conditions which may follow.

There is one other reason why a slight haemorrhage in the upper respiratory passage is significant. This is because of the importance of diagnosis from haemorrhages in the lower air-passages and pulmonary haemoptysis. And although we cannot be absolutely sure that there was no haemorrhage from the lungs, yet in the absence of any expectoration the discovery of a bleeding point in the upper air-passages may be regarded as a favourable sign.

If we omit accidental solutions of continuity which may affect any mucous membrane, the haemorrhages are mostly caused by conditions which a healthy mucosa can bear, but which act as traumata when its resistance is diminished. If, as in many forms of chronic rhinitis, we find the mucous membrane much thickened at certain places, while in other parts the superficial layers are so delicate that the slightest touch produces copious haemorrhage, the prophylaxis of such haemorrhage must be local treatment of the disease and thorough treatment of any near or remote cause. If the haemorrhage comes from granulation tissue, the latter must be removed, or the original focus of disease in the nasal wall or adjacent cavities be exposed. In the naso-pharynx and also in the larynx, the cause of the haemorrhage is sometimes to be found in small firmly-adherent masses of secretion. They act either by drying up and thus producing sharp, circumscribed pressure on continguous parts, or by being dislodged or coughed out from their substratum. It is important to look for and remove these masses, and then to prevent the recurrence of the condition by treating the primary disease. I have described a case where such an encrusted mass in the anterior wall of the trachea acting as a foreign body caused great trouble and frequent haemorrhage, which made me suspect phthisis. With the instrumental removal of the scab all troubles ceased. There is also a case of Sommerbrodt's in which a submucous haemorrhage of the size of a cherry-stone in the inter-arytaenoid space simulated a foreign body and caused similar troubles. It was situated between the posterior laryngeal wall and the mucous membrane of the pharynx, and was explained by him as having been caused by bruising of this part by a hard morsel of food.

More frequently small pointed foreign bodies are the cause of slight injuries with haemorrhage in the mouth or pharynx, most frequently in the crypts of the tonsils and at the base of the tongue. For the prophylactic treatment of these haemorrhages, a careful examination of this part must be made. If this were not so often

neglected, foreign bodies in the tonsils and concretions would not be so rarely discovered. The prophylactic treatment of the various morbid conditions which have caused these haemorrhages, must not as we have seen be restricted to local treatment. It must be extended to all those general or distant primary conditions which produce persistent and recurring catarrh or congestion. The nature of the primary cause may be such that local treatment must not be adopted, as for example when changes in the mucous membrane are associated with local changes in the vascular system, more especially when there is evidently one common cause of the two conditions. Most important amongst these causes are the peripheral obstructions caused by disease of the heart, kidneys and liver, and those which we trace to atheromatous degeneration. In the course of these diseases, permanent distension and over-filling of the veins may occur and finally a varicose condition arises. The knowledge and diagnosis of these conditions will prevent us from adopting local treatment which might unintentionally and unexpectedly injure these structures and lead to serious haemorrhage.

Among haemorrhages for which it may be questionable whether local treatment should be adopted are those puzzling vicarious haemorrhages. In making a diagnosis of vicarious haemorrhage we must be very careful that all local causes are really excluded. Here as well as in the analogous cases in the ear, there is always great difficulty because the commencement of the bleeding can scarcely ever be certainly seen. I can but repeat the advice that these cases must be approached with great caution and with special attention to the nervous system, and we must carefully exclude auto-suggestive influences which may so readily occur.

Among symptomatic haemorrhages from the upper respiratory passages, the early forms of acute infective diseases have a special cause and are amenable to treatment; they owe their origin to early catarrh and the aetiology is therefore similar to that stated above, namely that with some swelling or softening of the mucous

membrane, a trivial cause, such as sneezing, blowing the nose, or coughing may suffice to cause a solution of continuity. The best prophylaxis in such haemorrhage is not an attempt at local treatment—this ought always to be avoided in the early stage of acute catarrh; but we should rather endeavour to avoid or restrict the movements which induced the haemorrhage. Drugs should be given to diminish the tendency to coughing; secretions which are difficult to remove or which accumulate in large quantity should be removed by gentle gargling and careful washing out or by syringing the nose and nasopharynx. Violently blowing the nose must be forbidden. Bresgen was right in pointing out that the hygiene of the nose requires that patients should be told how to blow the nose; following his example, I always recommend in chronic catarrh and congestion, and after operations so soon as blowing of the nose is allowed, that the secretion should be blown out of one nostril only at a time, and that all great efforts in blowing should be avoided. Among the chief causes of the early forms of haemorrhage mentioned above are measles, scarlatina, diphtheria, German measles, and acute rheumatism.

The explanation is different in those haemorrhages which may occur during the later course of infectious processes; prophylactic treatment is scarcely possible here because they are caused by the characteristic exanthem or exudation. The same is true of haemorrhages from the upper respiratory passages which are the consequence of some change in the blood or general cachexia. Such are the late haemorrhages in smallpox, and the haemorrhages of leukaemia, pernicious anaemia, scurvy, purpura and chronic mercurialism. But in some diseases extravasations occur in which care and prophylactic measures may be useful: this is the case with whooping cough, where the haemorrhage may be regarded as the symptom of some injury in the same way as the conjunctival and cerebral haemorrhages which have also been observed. I would again repeat that such haemorrhages in adults may simulate phthisis when the symptoms

are not so marked and clear as in whooping cough in children and when the extravasations, as is usual, are small and not readily seen. I have described one case in which an exceptionally large extravasation was present, the whole mass of one vocal cord and the tissue below it being filled by it; this had been preceded by repeated small haemorrhages in which the blood had escaped externally. But when the large extravasation appeared, these ceased and aphonia with moderate dyspnoea set in. As a guide to the treatment required, I may mention that in such cases removal of the extravasation by puncture or incision may become necessary to relieve the dyspnoea. In the case described, this was not done because absorption soon occurred with suitable internal treatment (bromoform, quinine and belladonna), the extravasation was no longer so tense and the slight dyspnoea disappeared. Nevertheless, prophylaxis requires a very careful watch to be kept over these conditions, in order when necessary to prevent a sudden bursting with its accompanying dangers.

It is sufficiently obvious from what has been said, that in the sense of prophylaxis less stress is to be laid upon the treatment of such haemorrhage than upon the curative treatment of the disease which caused the haemorrhage. Thus slight haemorrhage which has been proved to come from the region of the upper air-passages does not always need any direct treatment. They may be left alone if the injurious conditions which caused them are avoided.

Blowing the nose while standing up must be avoided in nasal and pharyngeal haemorrhage; the patient must rest in the horizontal position, with the head moderately raised and inclined slightly backwards. Similarly, in haemorrhage from the larynx, coughing and clearing the throat must be suppressed; the external application of cold is a very useful aid in this. The treatment of the haemorrhage itself may increase in importance, if the constant recurrence of even a small haemorrhage or the general condition of the patient makes one fear the injurious consequences of the loss of blood. So too, when a haemorrhage slight in itself

continues for a long time and thus becomes troublesome. It deserves mention that in general medical practice the methods which are most successful and least troublesome to the patient are not always hit upon. And therefore in this description of prophylaxis we shall now consider some of the methods of local treatment which may be needed in addition to treatment of the primary cause.

The prophylaxis of haemorrhage includes the care of the nasal cavity and of the pharynx after operations, and strictly speaking, also the preparations to be made against severe haemorrhage which if not certainly expected may nevertheless, if they occur, cause sudden death, not so much by their severity as because the blood passes down the larynx, filling the air-passages. I may suggest here that the boldness of operators in these respects are in inverse proportion to the unexpected and unpleasant experiences they may have had. This is shown in the views held about tonsillotomy and now expressed by many; while some cannot understand why one is disinclined to use the tonsillotome or scalpel which have been successful in their hands in so many cases, without exception, there are others whose own unfortunate experience of post-operative haemorrhage makes them use the galvano-cautery only. The same is the case with removal of Luschka's tonsil, with operations for adenoid growths and the various small operations performed in the anterior nares; although the haemorrhage may be only slight and seem likely to cease early, one often may feel in doubt directly after the operation whether or not to use a plug as a prophylactic.

In removal of adenoids the danger of haemorrhage is generally so slight that such a preventive measure is very rarely indicated in the first few hours or first few days. It is advisable that the ring curette in this operation should only be used gently and not pressed forcibly against the roof of the pharynx. Neither is it at all pleasant for the operator when the curette breaks and even a portion of it remains behind. One should not expect too much of the knife, and before using it should examine it carefully. So too, one should always try the tonsillotome before use, to see that

it is sound, and should select from the various sizes and forms that instrument which is best adapted to avoid accidents. Nussbaum described a case where the instrument broke and remained in the tonsil which was still unremoved. The very rare occurrence of an abnormal course of the internal carotid may be omitted, because in such an injury which could not be foreseen surgical aid is generally too late; but I met with one case where directly after removal of adenoid growths I was obliged to proceed to tracheotomy, and after aspiration, long continued artificial respiration through the tracheal opening saved the life of the child.

The prophylactic treatment of peritonsillitis and of retropharyngeal abscess requires an early incision. Wendt showed that delay in opening these abscesses might lead to fatal extension into the thorax. The danger of erosion of larger or smaller vessels should also be considered. I wrote in 1895, "It is a very unpleasant experience to meet with profuse arterial haemorrhage when the incision is made, as has occasionally happened to me with patients seen in a late stage, and I would advise that under the conditions mentioned (that is, great tension, difficult evacuation, deep seat and long duration of the disease), an exploratory puncture should be made. Then we shall at least be able to have ready everything required to stop the haemorrhage." Since then I have had a fatal case through haemorrhage and flooding of the larynx, in consequence of erosion of the carotid. This was in a very weakly child, markedly pale and much run down, who according to the mother's account had refused food for several days, and who had a very tense, fluctuating, and apparently very painful peritonsillar swelling, and a fluctuating swelling under the chin. After the latter had been opened and the contents proved to be pus, the peritonsillar swelling was punctured at its most prominent point with a small scalpel. The result was an enormous arterial haemorrhage. Immediate tracheotomy proved useless. It would have been better in this case—from the operator's point of view—to have explored the swelling first with a very fine needle, because an ordinary large canula

would probably also have caused haemorrhage. We were led to deviate from our own rule in this unfortunate case by the descent of the pus to the swelling in the neck, the purulent contents of which made us assume that the peritonsillar swelling was also purulent. No pulsation was perceptible in it. And though from the clinical aspect, one must not omit to mention that the ultimate spontaneous rupture, which would have been unavoidable, would have led to the same fatal issue if the child had not succumbed to exhaustion, yet the details of this case are instructive in showing us that in such cases we cannot adopt too careful preliminary and preventive measures, especially when we take over the case of a patient whose previous history is not known to to us.

After operations with the galvano-cautery on the nasal mucous membrane, the open treatment is known to be best and treatment by plugging is in general contra-indicated: the wound does best and the healing is most rapid when haemorrhage has been avoided in applying the galvano-cautery.

After all operations on the bones, plugging should be used as a prophylactic. Even after removal of a portion of a turbinate bone, where formerly I tried to do without plugging, I now advise its adoption, except in cases where the patient remains under my immediate observation.

Some recommend that an eschar made by the cautery should cover the wound to act as a prophylactic or as a direct styptic. Liquor ferri perchloridi may be painted over it for this purpose, or a solution of chromic acid or trichloracetic acid, or the hot iron may be employed. The use of such measures is obvious. They are the more important when we have to treat regions where compression cannot be applied, as in the pharynx and larynx. But we must not expect them to be of use in very severe haemorrhage, because under such conditions they are scarcely applicable. In these cases when plugging cannot be resorted to, it becomes necessary to compress or ligature the vessel supplying the part, and in these cases it is best to combine the methods for temporarily and for permanently stopping the

haemorrhage. Even plugging is not a sure method of arresting bleeding and is often used only temporarily when the bleeding point cannot be found. In this respect, a case of Kiesselbach's is very instructive, where the patient died of nasal haemorrhage in spite of plugging; and the patient preferred to die rather than put up with the plugging any longer.

After plugging of the nares, long persistent mental depression or true melancholia may set in for which the loss of blood is probably responsible. I have also drawn attention to the over-filling of the lymphatic channels and of the subarachnoid space which nasal plugging causes, and which possibly may be the cause of cerebral nutritional disturbances. To prevent such consequences, the use of plugging should be as far as possible restricted, both as regards its extent and its duration. It is best, when possible, to apply the plug or compression in such a way that it acts upon the bleeding part only, without interfering with the rest of the nasal cavity. One kind of plug is made in the form of a soft rubber tube with a distal bulb and suitable inlet tube, so that it may be filled with air or with iced water and closed by a tap and so be kept in situ. They have the advantage of being easily refilled or replaced. I have invented and shown such instruments which are easy to use and clean. So too for haemorrhage from the anterior part of the septum, at Kiesselbach's spot, I have devised suitable, self-retaining metal instruments, which compress the bleeding point without obstructing nasal respiration.

The Prevention of the Diseases of the Urinary Organs and of the Male Generative Organs

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The Prevention of the Diseases of the Urinary Organs and of the Male Generative Organs

In the male there is so close a connection between diseases of the urinary apparatus and diseases of the generative organs, that it seems best to consider them together. Diseases of the generative apparatus in the female have already been considered elsewhere; we shall therefore omit them.

A. General Prophylaxis

The general principles of diet and of hygiene are important in the prophylactic treatment of the urinary and sexual organs. Misuse of these organs may be the direct cause of disease of them; for example, sexual excess may cause sexual nervous troubles, and cold may cause nephritis. Diseases of the genito-urinary apparatus may also appear indirectly. It may be secondary to some other disease; for instance, nephritis may occur after diphtheria, or after poisoning with chlorate of potassium. Urogenital tuberculosis may be secondary to tuberculosis in other parts; sexual neurasthenia may be part of a general neurasthenia. It would take us too far from our subject if we were to describe these here. We therefore refer the reader to those sections which deal with these matters.

On the other hand, we shall regard it as part of our work to consider certain changes in the urine and certain general prophylactic measures in disease of the kidneys. In the urine,

we may meet with albumin as an abnormal constituent. In so far as its presence is due to kidney disease, there is nothing to add to what will be said about it later. But slight albuminuria may occur after intense mental emotion, or bodily exertion, or after high feeding, especially with food rich in albumin, and after cold in persons otherwise healthy and still young; this is termed physiological albuminuria. The limits of physiological albuminuria have been considerably reduced during the last few years, for this slight albuminuria is often only the commencement of an insidious disease of the kidneys. These cases therefore deserve very careful watching and treatment; partly because we are justified in assuming that this form of albuminuria owes its origin to injury of the renal epithelium, even if only transient, and partly because it seems possible that when such transient injuries are recurrent they may finally lead to a more serious permanent renal lesion. The observations of J. Müller as to the formation of casts in the urine of cyclists seem especially interesting in this connection. Casts are probably somewhat more significant than mere albuminuria. It would be well to have the urine of all people examined from time to time for albumin and sugar, for examination of the urine would prevent many a renal trouble. Blood in the urine is no less significant than albumin. It is generally a sign of disease of the urinary tract (most often of the kidneys) and is then of less interest and importance than the disease itself (apart, of course, from its symptomatic significance); yet new growths, stones and parasites of the urinary tract may sometimes cause haemorrhage so serious as to threaten life, and haemorrhage is then the chief factor. Prophylaxis of these diseases is at the same time prophylaxis of the haemorrhages. Far more important are those haemorrhages which may arise as the result of diseases of the blood, such as purpura and scurvy, and in haemophilia. They are sometimes the only symptom of the latter disease, and may then be termed renal haemophilia, as Senator suggested. The prophylaxis of these diseases belongs entirely to internal medicine and surgery; we therefore refer the reader to those sections.

Much more numerous are the cases in which instead of unaltered blood we find only the colouring matter of the blood—haemoglobin or methaemoglobin—in the urine; this is haemoglobinuria. Some drugs are very harmful in this respect. Certain poisons are introduced into the body for therapeutic purposes, and whether introduced through the digestive tract, skin, mucous membrane or subcutaneous tissue, they may in large doses disintegrate the red corpuscles in the blood and produce haemoglobinuria and other serious consequences. The greatest care is required in the use of chlorates and of the mineral acids, carbolic acid, napthol, iodine, arsenic, and especially of glycerine and pyrogallol. These should be given as little as possible to children, and not in too great doses to adults. We should first accustom the body to them, and in external applications we should not apply them too extensively and above all not to absorbent parts of the skin. For these reasons, apart from other reasons against all intra-uterine injections in pregnancy and parturition, caution must be observed in using glycerine intra-uterine injections to induce abortion, as has recently been recommended. The value of the internal use of hydrochloric acid, as recommended by Unna, during the application of pyrogallol needs confirmation. This would be like setting the fox to mind the geese. The prophylaxis of haemoglobinuria in burns and in severe infective diseases is the prophylaxis of these diseases. In respect to malaria, some assert, though others are not of the same opinion, that the long continued use of quinine produces the worst type of malaria, "blackwater fever," with haemoglobinuria. Lastly, mention must be made of so-called "paroxysmal haemoglobinuria," in which attacks of haemoglobinuria occur with other characteristic symptoms.

The essential nature of this disease is still unknown, and prophylaxis is therefore limited to forbidding the patient to do that which experience has shown may call forth an attack, especially much walking or being out in the cold, and particularly walking in cold weather. Patients among the higher classes may therefore with advantage be sent to winter in a warmer climate. In this way we can prevent

attacks or at least curtail them. When there is syphilis or malaria present, specific treatment should be used for the disease. One may also try Chvostek's method of giving amyl nitrite at the commencement of the attack. He is of opinion that the condition is caused by spastic contraction of the cutaneous vessels.

Another symptom of many kidney diseases is dropsy, which may develop either as anasarca or as an ascites. Most accept Cohnheim's theory and regard it as due to a transudation through the vessel walls caused by the retention of urinary substances. In the chronic forms hydraemia may be an additional cause. When the heart fails during the course of a nephritis this factor in the causation of oedema must also be considered. The prophylaxis of dropsy is firstly that of the primary trouble. When there is inflammation of the kidneys, drugs given for the nephritis will in favourable cases also act upon the dropsy, and in acute nephritis this will suffice. In chronic cases on the other hand, correct treatment of the dropsy is one of the most important prophylactic measures in the treatment of the chief trouble. One danger which may arise from the dropsy is encroachment upon the space in the large cavities of the body, by which the action of the heart and lungs is interfered with; also oedema of the brain, vocal cords and lungs may directly threaten life; oedema of the mucous membrane of the stomach and intestines may produce digestive disturbances; and oedema of the skin, which when tense may crack and allow of the entrance of pathogenic germs, may thus cause death by erysipelas and gangrene. This danger of sepsis occurs also when operative procedures are undertaken to relieve the excessive tension of the skin. Scarification which opens up many points of entry for germs, cannot therefore be recommended. Even the incisions which Senator does not condemn are far less valuable than capillary drainage in which small hollow needles only are passed through the skin, and the serous fluid runs away through a long elastic tube into a glass vessel containing some antiseptic solution. The skin, the instruments and the hands of the operator must be first disinfected by

the ordinary methods, and the points of puncture covered with salicylic or sterilized wool. For the same reason, a hollow needle should not be left in more than two days. With restless patients it is well to remove the needle at night. After removing the needle antiseptic wool should be bandaged over the wound, because fluid is apt to ooze for some time afterwards. Tapping of the body cavities which contain fluid, and scarification of the oedematous vocal cords, or tracheotomy, which may become necessary, must be carried out by the ordinary rules. In practice tracheotomy is probably better than scarification of the cords. In cases where oedema of the glottis threatens, everything should be ready at hand, so that when the danger occurs there may be no delay. These are the local measures for dropsy; but even when other means are employed to reduce the general oedema, certain precautions must not be omitted. The administration of drugs to cure the thirst is now probably discarded by all, because of the dangers of paralysis of the heart and uraemia. Instead of these, we employ diuretics, diaphoretics and laxatives with good effect. In ordering diuretics none that are drastic must be used; in acute cases, carbonates of the alkalies and salts of the vegetable acids are suitable; or if necessary digitalis and diuretin may be given. In chronic cases other diuretics may be given, such as linseed tea, squills and caffeïn. Calomel is very effectual, but also very untrustworthy; more than fifteen grains in three days must not be given, nor must it be given for any long period. Notthafft had one case, which had been treated elsewhere by calomel, end fatally from mercurial enteritis; and in another case, where he himself administered calomel very cautiously, a severe stomatitis followed.

Diaphoresis can be usefully obtained by warm or very hot baths from 96° F. to 104° F., dry warm packs or moist hot packs, hot-air baths and hot-sand baths. But in using these means the head should be covered with a cool compress to prevent an apoplectic attack, and the method should not be carried to extremes, otherwise the heart may be injured, and moreover by too strong diaphoresis, urinary constituents in the blood may accumulate and cause uraemia. The

internal administration of diaphoretics, such as pilocarpine or the salicilates, is not to be advised, because they are either ineffectual or are cardiac poisons. If we desire to carry away the fluid through the intestines we must, especially in recent cases, beware of purgatives which irritate the kidneys, and should use those which are mildest, such as salines and vegetable purgatives. That all dropsical patients should be confined to bed, or at least be in absolute rest, is self evident.

Uraemia sets in when the kidneys and the skin and the intestines no longer suffice to remove waste products of metabolism from the body. We should then in addition to attempting to restore the action of the kidneys by diuretics, and especially by digitalis, try to excite the vicarious action of the intestines and the skin. Treatment of the nephritis and of the dropsy is thus also a preventive of uraemia. If slight uraemic signs are already present, and especially in chronic cases, we must not delay. However, in promoting the activity of the intestines and skin great care is needed, because too energetic purgation may cause poisonous matters which are difficult to eliminate to accumulate in the blood, and thus produce uraemia instead of preventing it. In the chronic uraemic conditions which may follow certain strictures, diseases of the bladder and surgical kidney, special care is required in any intra-urethral manipulations or an attack may be brought on. Senator recommends as a prophylactic, that the patient's diet should consist largely of milk, or even better, of skim milk because this is poor in the extractives which probably cause the uraemia.

Special mention must be made of venereal disease as a cause of disease of the genito-urinary organs.

Venereal disease is perhaps as old as humanity, and almost equally old are the attempts to prevent it by prophylaxis. Some forms of venereal disease were evidently known to writers of the most ancient times, while syphilis was probably brought over from Japan or India at the commencement of the fifteenth century. Textbooks on syphilis state either that syphilis originated from America, or that it has existed from the most ancient times in the countries around the Mediterranean, Asia Minor and Central Asia. Both

these statements are incorrect. Against the first statement we may cite the fact that the first irrefutable descriptions of syphilis by European writers date from the middle of the fifteenth century, that is before the discovery of America, and that syphilitic bones are found in those American graves which are more recent than the discovery of this continent by Europeans. Against the second hypothesis, we may say that it is contrary to all our experience of epidemic diseases, that a pestilence which had been known from time immemorial, which is epidemic in character, and could spread without limit, and which had by the end of the fifteenth century permeated the whole Western world, could nevertheless suddenly have appeared in such a terribly pestilential form. This occurs only with a disease coming to a people not yet permeated by it. But as syphilis was certainly known in ancient India and Japan, and as just before the appearance of the first sporadic outbreak of syphilis in Europe an active overland intercourse with Asia had developed, it was probably introduced from those countries. The expedition under Charles VIII was then the accidental opportunity for the spread of this pestilence.

Attempts to prevent venereal disease have not been very successful. Blaschko asserts that in Berlin every ninth or tenth person has had syphilis, and Ströhmberg says that twenty-four per cent. of the medical students of the University of Dorpat take home with them not only their doctor's certificate but also syphilis.

The chief source of the spread of venereal disease has long been prostitution; in other words, illegitimate sexual intercourse. It is therefore true that to prevent venereal disease we must first prevent prostitution. Prostitution is thoroughly dealt with in another part of this book, where are considered the ways in which the removal of this danger of prostitution may be effected by doctors and sanitary police. In regard to this battle against prostitution, we shall only consider that aspect which is concerned not in fighting the consequences of the evil, but the evil itself.

In the battle against prostitution many means have been

adopted, but only a small number of these can be recommended. In the first place, all attempts to suppress prostitution by force must be rejected. History shows that all such attempts have been in vain: neither the burning of prostitutes among the Jews, nor the public floggings under the West Goth king Recared and under Charlemagne, nor the public ducking at Toulouse and Bordeaux, nor the confinement for life of the Berlin prostitutes in Spandau, nor branding with hot irons, banishment, and capital punishment under Louis IX of France, nor the severest laws in other countries have been able to extinguish prostitution even for a time. On the other hand, all drastic attempts to suppress it have only caused an increase of secret prostitution, as is shown by the conditions in Italy to-day. From this it does not follow that prostitution is a necessary evil which cannot be exterminated, but in view of the teachings of history it is time to give up these childish attempts to remove by punishment and police regulations a form of social disease which arises from degeneration.

We may conclude from the uncivilized native races of the present day what were the past conditions of the now civilized races. History teaches us that the woman developed the idea of morality more intensely and more rapidly than the man, who thus remained behind her. The esteem which the woman thus gained, the forbearance which love bestowed upon her, worked also for good in the man; from a polygamous condition civilized man passed to the monogamous. But as morality is a late acquirement of civilization it will be the first to be abandoned under evil influences, and it is therefore not at all surprising to see polygamous tendencies arise again in the man, which are to be regarded as the expression of a physiological weakness. The man who, without any higher motives, shuns sexual intercourse is as abnormal a pathological specimen as the virgin woman who seeks intercourse, says Krafft-Ebing. A woman who gives way to vice represents therefore a reversion to an earlier period of time and morality than if a man does so. This somewhat theoretical

idea gains strong confirmation from the descriptions of the characters of mind and body of prostitutes, which we owe to Parent-Duchatelet, Lombroso, Pauline Tarnowskaja and Ströhmberg. The want of veracity among prostitutes, their deceitfulness, ethical and religious dulness, indifference to sexual infection, avarice, violence, craving for pleasure, vanity and ingratitude, their origin from degenerated proletarians and criminals, and above all their sexual obtuseness and more or less complete want of altruistic feelings (love of parents, husband, or child) show them undoubtedly to be degenerate beings. There is this difference between them, that about a half of their number is composed of those who are naturally indolent, while the other half from their close connection with crime and sometimes their own criminal acts prove themselves to be the female counterpart of the male criminals and vagabonds. Both classes are parasites on the social body. The harder the struggle for existence, the more prominent is the parasitic nature of these members. Lombroso and Tarnowskaja draw attention also to the large number of bodily "signs of degeneracy" in prostitutes, which are much more numerous than the signs of degeneracy found in criminal women. We have entered somewhat fully into the natural history of prostitutes, because it shows us clearly what are the causes of prostitution.

These are the demands of the man who has these polygamous tendencies, and the physiological weakness of the prostitute, which represents a degenerate type. Thus prostitution is seen to be a social and biological morbid condition which cannot be exterminated by police regulations and laws, that is by force. The war against prostitution then must not be a war against prostitutes and brothel-keepers, but a war against the demand and the supply. The factors which must first be brought to bear upon it are religion, education and knowledge. As to the value of religious training for the acquisition of moral principles of life, it is superfluous to say anything here. Boys should be taught from their earliest youth that women have equal privileges; because the history of the past

teaches us that with the increase in esteem of the woman, polygamy and prostitution diminish. And the girl should not be brought up as a doll but as a child enjoying life. Many to-day recommend active games, regularly played, as the best means against all that is unnatural. But the growing youth must not be anxiously kept from the knowledge of sex u matters, but should at the right time be taught at school or at home that the instinct which is awaking in him is closely connected with everything great and noble that stirs the human heart and mind, and must not therefore be used for common lust; that the founding of a family, if there are no higher grounds against it, is the duty of the citizen and that the misuse of the sexual instinct is bound up with the greatest dangers to his health. To-day, unfortunately, it is left to the young man himself to procure this knowledge from some (generally an unclean) source. We cannot sufficiently warn against reading the writings of abolitionists. These works which, most of them, present the prostitute only as a victim of social conditions who is to be pitied, as the product of the sexual lust of the man (possibly of the better classes) and thus commit the error of comparing the degenerate prostitute with the respectable woman, are too apt to make the young, inexperienced man look upon the prostitute as an unfortunate, fallen girl who should be pitied; and for this reason, as experience shows, such youths fall most quickly into the hands of prostitutes. But the young man must not only be warned against intercourse with prostitutes in the narrower sense of the word, but against all illegitimate intercourse. It is particularly the ever increasing illicit intercourse in large cities, garrison towns and university towns, which is like a cancerous growth, a festering sore in the moral character of the young. This illicit intercourse which is glorified in the most revolting way by modern dramatists and novel writers, and unfortunately also on the stage and in certain periodicals, has the apparent advantage of protecting young people against infection by prostitutes; in reality such is not the case. Most only take up this illicit intercourse after they have become infected through prosti-

tution; like burnt children they avoid the fire; a very large percentage do become infected by such illicit intercourse, and that a small minority do not become infected does not counter-balance the demoralizing influences which it exercises on both parties to it. The girl who after her first illicit intercourse often enters into a second, a third and so on, becomes certainly only in a few cases a prostitute, if one adopts the definition that prostitution denotes giving up the female body for sexual purposes in return for money, but—if one considers merely the means taken for the prevention of conception—the moral character of the girl is gradually completely ruined. And even if she herself does not become a prostitute, her daughter very probably will. Therefore we were very glad to find some eminent German academic teachers a short time ago giving advice about morality to the youths at the university. They pointed out that sexual abstinence is right for the young and that it is not injurious. One cannot too strongly fight against that banal phrase, "a natural instinct which it is unnatural to fight against." The injury which is done to so many by the illegitimate satisfaction of the sexual instinct is a million times greater than the trouble which a few sexual neurasthenics feel from this abstinence.

Many of those who hear this message of the value of abstinence do not believe it; and there are still more who have never heard the message at all. Here, what private hygiene fails to do, public hygiene must undertake. The blind man needs a guardian if he is not to set fire to others by a lighted torch. If culture and morality do not advance in a straight line but in waves, we are at present as regards morality in a very deep valley. Sometimes, too, by a misuse of art, ideas of the grossest nature are spread by being exhibited in shops, upon the stage, in periodicals, advertisements, literature and paintings. It is certainly necessary that the Government should act more stringently in this matter, undeterred by the outcry of those whose "business" will be curtailed thereby. The only doubt that exists is as to the method to be adopted. The difficulties are not small.

The attempt to accomplish something by legal enactments has failed in the German Empire, and was not, besides, a happy idea. Such legal judgments might have interfered with art (though this danger was not so great as seemed at first, because public opinion would soon have found a remedy), and such enactments moreover cannot be precisely enough drawn up to prevent the culprits from slipping easily through the wide meshes as they have before. The best method perhaps would be to increase the discretionary power of the police, and to let them have the advice of a committee of representatives of art, which could veto any proposed measures that seemed undesirable. To-day, the police aim at restricting registered prostitution as much as possible, and thereby naturally only increase secret prostitution, and thus increase the amount of sexual disease.

But knowledge is also an important factor in the battle against prostitution. The people should, in this respect, be taught more and more about the terrible extent of venereal disease, about the ease with which it may be acquired, about the difficulty of curing it, and its terrible results often for many years after infection. Societies for improving the education of the people would do a great service if they were to take this teaching out of the hands of undesirable writers. Already in several German universities public lectures are given on the prevention of venereal disease, in which it is not recommended that precautionary measures be taken before and after coitus, but in which a description is given of the dangers of sexual diseases and of the infection in prostitutes, and abstinence is advised. The campaign against the abuse of alcohol is our ally, because alcohol is a sexual stimulant, and on the other hand it paralyses the normal inhibition apparatus over which the will presides. The experience of physicians confirms the statement that most infections take place under the influence of alcohol.

The campaign against solicitation is very hopeless in comparison with the struggle against the demand. Wherever there is the demand for it, solicitation will certainly soon appear. Among prostitutes, only about eight per

thousand are prostitutes by chance; that is, girls who were led into prostitution by social circumstances, by misfortune, insufficient pay, or by being led astray. These eight per thousand probably are those who show themselves capable of improvement, while the indolent and active criminal classes are incapable of improvement. Generally, the number of these prostitutes by chance is considerably over-estimated; abolitionists and social democrats especially do much in distorting the facts. Nine hundred and ninety-two per thousand of prostitutes follow their trade because they will not work. It is quite illogical to say that a girl who is in want must be idle if she is to get herself out of want. The difference is simply this, that the normal woman in want starves and strains her powers to the utmost, and would rather die than lead a life of shame; but that the degenerated prostitute does not want to work, and therefore takes up prostitution and only afterwards, as a rule, suffers want. We do not deny the abuses in the under-payment of female workers. The conditions in the Berlin mantle manufactories are well known, and, according to Charles Benoist thousands of workwomen in Paris work day and night to earn 250 to 350 francs a year. To infer more from these figures than that many thousands of women must suffer hunger and starvation from such starvation-wages would be unscientific. He ill understands the woman's heart who believes that she sacrifices her virginity so readily for money; even the second and third illicit connections of such girls are entered into more from vanity, sensuality, and love of pleasure than to earn a livelihood. Nevertheless, we must not be deceived thereby into believing that there exist no callings where the woman would earn nothing if she did not live as a prostitute. Even if the workwoman does not, as so many graphically picture her, sink step by step till she finally goes upon the street, yet such under-payment is a moral harm. For in poverty and misery immorality thrives; and in this mephitic atmosphere prostitution also flourishes.

Being led astray is given as a further occasional cause.

But this is true only in the indirect way just pointed out; the real prostitute becomes one in the circle from which she comes. The stories as to prostitutes being led away are largely false, and in the very narratives which reach the columns of our newspapers, concerning an international trade in girls, it is not as a rule the deception of an innocent girl, but the selling of herself by a prostitute who this time, for a change, sells herself to a foreign purchaser, as she had previously a hundred times sold herself in her own country. Town life has a very significant bearing on this subject. The opportunity it gives of earning more easily and of leading a lazy life unhindered exercises a powerful attraction upon the more worthless individuals in the country. These individuals who in the narrow circle of clearly-defined duties might remain virtuous, there go under. Such an exodus from the country can only be stopped by restricting free emigration; it would be a beneficial regulation, but there is as yet no prospect of it being put into operation.

The excess of men has been named as a cause of prostitution, but does not really exist; and also that men do not marry. The fact is that prostitution flourishes not because many men do not marry, but that many men cannot marry because they are in the hands of prostitutes. In general, the money which is required for the latter and for the bachelor life is together much more than would be required for the expenses of an ordinary household.

With such facts before us, obtained from the unprejudiced enquiry into the origin of prostitution, one feels very sceptical about the possibility of directly reducing solicitation. We can try to rouse the public against immorality, alcohol and syphilis, but we shall not be able to accomplish much. We cannot deprive all criminal parents of the care of their children, and compulsory school education is of little use for degenerate children. We must be content, unfortunately, with helping poor respectable working people to educate their children and save them from intercourse with degenerate individuals. A tax to be levied on unmarried men and paid to girls

who are in need, from fourteen years of age till their marriage, would only be putting a premium on laziness.

In view of the want of success which has followed the endeavours to get rid of prostitution, in view of the poor prospect of soon being able to diminish solicitation and demand, there remains nothing for the Government to do except to control it. The right of the State to register and control prostitutes has indeed been contested by the abolitionists, because it is an encroachment upon personal liberty; but apart from the question whether prostitutes should have the same rights as the rest of the people, prostitutes are certainly a great source of venereal disease, and their indolence as regards these diseases and their unwillingness to be controlled increase this danger, and thus they are absolutely at variance with the good order of a state governed by the principles of altruism. Throughout the state the wishes of the individual must give way to the interests of the whole; and there is no reason why an exception should be made with prostitutes. On the other hand, the objection has been raised that control has been of no use, and statistics are brought forward in proof of this. But nowhere so much as in this subject can the personal bias of the investigator be brought to bear upon statistics, and we agree with Joseph that the statistics are quite unreliable either pro or contra. Ordinary commonsense tells us that by the compulsory detention of prostitutes during the time when they show infectious symptoms, their ability to spread disease is removed, and that compulsory detention must be beneficial. But what form should the control take? This must necessarily be threefold: administrative, medical and penal.

The administrative work must be to find the secret prostitutes and to see that they are registered. The removal of secret prostitution is its most important object. All regulations devised against prostitution are illusory until one makes up one's mind to lay the axe to the root and make secret prostitution impossible. Their number is perhaps ten times as great as the number of registered prostitutes, and their danger is still greater. Most sexual

disease is developed through secret prostitution; the fact that these prostitutes are not treated keeps them longer infectious, and their disease is more harmful both to them and to those whom they infect. We know the number of prostitutes in civilized countries; as prostitution represents a form of social degeneration, their number everywhere must be about the same, and this is according to Russian authorities, about 5·6 per thousand of inhabitants. The administrative authorities have therefore a fairly trustworthy guide for ascertaining if their arrangements are adequate for the discovery and registration of all secret prostitution. At the present day Berlin controls only 1·9 per thousand, and Brussels only ·5 per thousand of its inhabitants, while several Russian towns have reached over 5 per thousand of their inhabitants.

The police arrangements of to-day are sufficient only for the smaller towns under 30,000 inhabitants; in the larger towns they are not adequate for the work to be done. Power should be given to the local authorities of these towns to enable them to control public morality and organize their own detective service. For this purpose they must have a sufficient number of trained and trustworthy officers, who would secure the notification of secret prostitutes, and who would be tactful enough not, on the one hand, to be deceived by an elegant appearance, nor on the other hand, to mistake innocent women and girls. They should have no other police duties; it must be the duty of others to make the arrests. We must also warn against doing what the police have sometimes unwisely done, that is, going so far in their zeal for morality as to put under control girls who carry on illicit intercourse. Thereby one only increases prostitution. The question whether registered houses or separate houses should be allowed is very difficult. In reality, doing away with registered houses would not prevent several girls from living together under one woman, nor would it do away with all prostitution outside these houses. Our advice is like that of Jadassohn and Joseph, to try to work with the two systems combined. The closing of registered houses in large towns has certainly

been followed by the worst results, because it increases secret prostitution.

The second factor, the medical, has to do with the examination of prostitutes, independent of, but in sympathy with and supported by the administrative authorities. The examinations should be frequent, at least twice a week, and made where possible by specially trained physicians, and should not be limited to the external genitals, but extend to all parts of the body which may show signs of disease. Opinions as to the value to be attached to examination for gonococci vary very much. Neisser regards it as necessary, and this opinion is held by many eminent physicians and gynaecologists; others, as Behrend, regard it as superfluous. Certainly, if such examination is to become general, medical resources will have to be considerably increased. We shall probably not be wrong if we assume that every prostitute, whether we find the gonococcus or not, has had gonorrhoea. Medical control should be free from all police accessories; it should be of the nature of a medical consultation. Therefore we should only examine the prostitutes one by one. We should not treat them roughly, nor keep them waiting unnecessarily. For the same reason the examinations should not be made at police stations, but special stations should be provided in the various districts of each town. The best for this purpose would be hospitals which are fitted out with the necessary scientific appliances. In these hospitals it is possible also to carry out the treatment of syphilis, according to Fournier, for two or three years, the value of which, as regards prostitution alone, will probably not be denied by any physician versed in the subject. From these hospitals the prostitute could at any time be transferred to a hospital for compulsory treatment. The wards set apart in hospitals for diseased prostitutes need to be considerably enlarged. The cost of these arrangements must be borne by the State and community. The proposal made by a few, to institute a fund into which prostitutes should pay, and which would act beneficially because it would in part cover the expenses of examination and treatment, and give to the examination

more the nature of a medical consultation, has however the disadvantage that it would place prostitutes on a par with workpeople, and thus make prostitution recognized as a trade, and would signify at least the indirect payment of doctors by prostitutes, and this must be avoided. For the purpose of this control and regular examination, cards must be arranged for prostitutes, which bear the photograph of the prostitute, name, age, day and year of registration, date of previous infections, statement of treatment undergone, and dates of inspection. These cards should, on any change of residence, be sent by the authorities to the doctor in the district of the new place of abode, so that he may easily have a history of the case. But the cards of prostitutes, which tend, through the inadequate examinations at present made, to deceive the public as to the greatness of the danger, and which have been used to deceive by prostitutes themselves, should always have the photograph of the prostitute, and state the sexual diseases from which she has suffered. Many a man might, on reading the word "Syphilis," even though followed by the word "Cured," hesitate, and consider the matter once more.

The third factor, the penal, arises when prostitutes disregard the regulations, and is called for both by the administrative and the medical side.

In this way, one can and must succeed in efficiently controlling prostitution and reducing sexual disease. But a necessary condition is that there must be no penal paragraphs in the law, which would make one who gives a lodging to a prostitute be regarded as a procuror. It is certainly somewhat hard against the woman that the man who is suffering from venereal disease cannot also be medically controlled by the State during treatment. Apart from the fact that most women affected with venereal disease are not controlled, all proposals for any special laws about syphilis have proved to be utopian. It cannot be carried out unless the doctor who has been consulted in confidence, notifies the syphilis to the appointed medical authorities. The result would be that patients would no longer go to doctors, but to quacks, and that

sexual disease would still further spread. We should first at least have to put an end to quackery—a hope which at present has no prospect of fulfilment. This much, however, might in the present day be demanded ; that before marrying, both parties, or at least the man, should be examined to see whether he is sexually healthy. Meanwhile we must endeavour to explain to men the dangers of prostitution and the nature of sexual disease, and try to raise their sense of duty towards their fellow-beings. Only in the army and navy, and perhaps also in factories, can one undertake regular periodical examinations. In the army and in the navy, we must insist that the soldier or sailor does not leave the barracks or go on shore while he is ill. Certainly, from our experience, we can say, that these military examinations are evidently not made thoroughly enough, or that they are evaded. At the present day a very considerable number of soldiers are being treated outside the barracks. The introduction of examination in factories, to which the workmen would mostly raise no objection, would be very beneficial. One of us had an opportunity of seeing three extra-genital hard chancres in unmarried workwomen, which had been produced by the kiss of a syphilitic workman. The public has very little or no idea that there is danger of infection in the use of cups and glasses with broken rims in restaurants, and in the common use of wind instruments, blowpipes, tobacco pipes, and vessels for eating and drinking. In connection with the common use of drinking vessels in various religious ceremonies, the introduction of the American fashion may be recommended, where each worshipper brings his own vessel with him. As regards doctors themselves, we can only urge the greatest caution when they examine syphilitic patients, when selecting one from whom to remove the skin for transplantation on to another case, and in the selection of a wet nurse. Vaccination-syphilis has been done away with since the introduction of animal lymph, and the importance of the use of aseptic instruments is self-evident to the modern surgeon. For men and women of the lower class there should be the possibility of

treatment free of charge, by the establishment of sufficient hospitals in the large towns, where advice and medicine can be had free. These should, when possible, be open also during the evening, in order that workpeople may not have to give up their working hours and thus lose their wages. In these the people should be treated with the same amount of respect and regard for their feelings as in practice among the better classes. But they must be particularly told (and this applies to the better class of patients too) of the infective nature of their disease, of the duration of the infection, of the various ways in which infection may be conveyed, of the absolute need of living an abstinent life for a few years, and of being treated sufficiently long, and of not entering into marriage without first obtaining medical permission. The method adopted in some hospitals of giving printed rules to the patient does not seem to us advisable, because experience has shown us that these papers pass from one workman to another, and lead to self treatment without medical advice.

The general prophylaxis of sexual disease has been first mentioned because the most numerous diseases of the urinary and genital apparatus will thereby be prevented; but very great importance must also be laid upon another misuse of the genitals—we mean onanism. How far this may produce disease will be discussed in the special part. We understand by onanism artificial sensual stimulation of the genitals, produced by any manipulation whatever, but without the opposite sex. This vice is more common to-day than ever before, and is as a rule taught to children at the beginning of puberty by companions of the same age or older. There are schools and boarding schools where there is scarcely one scholar who does not indulge in this vice. In girls' schools such malpractices are, contrary to the current opinion, rare, and this corresponds with the fact that the normal woman does not feel the sexual impulse until cohabitation has taken place; previously it has only expressed itself in a vague longing for love, marriage and maternal happiness. With the growing knowledge of the evil of their immorality and also on account of their

marriage, most men give up this vice; but there are also men, who in spite of marriage or illicit intercourse, cannot give up this habit of their youth and practise it till their old age. The injury done by onanism is greatly exaggerated, especially in popular pamphlets, nevertheless we cannot regard it lightly. Apart from the tolerance of it, which differs in different individuals, one has also to consider the age at which the habit was commenced and the intensity with which it has been practised. The younger the individual, the more likely it is that permanent injury will develop. Moderate onanism in the grown man will be as little harmful as moderate sexual intercourse. We should bear in mind that onanists suffer also especially from so-called mental onanism, which is an artificial production and depicting of sensual ideas which are very apt to produce sexual neurasthenic disease, often bordering on the region of mental disease. If we put on one side the comparatively small number of cases where the patient is cured by the removal of vesical calculi, of phimosis with balanitis, of thread worms and other rectal or urogenital affections which can set up constant irritation, or by the method sometimes successful of a painful operation on the genitals, there remain then only general measures for the prevention of onanism.

"To find ways and means of preventing the pernicious vice of masturbation, especially of 'mental onanism,' is the first duty of teachers and is unquestionably one of the most important problems in the education of the young. Unceasing strict watching at the least suspicion, even during the night and in attending to the calls of nature, together with punishments, sometimes even corporal punishment" (blows on the nates should be avoided because they tend to cause erection), "in childhood and boyhood, and later a careful explanation of the pernicious consequences of the bad habit, will be the most effectual prophylaxis. Upon the whole, instruction and warnings given by doctors are more thought of and have a more lasting effect than lectures by parents, teachers and friends. Where the power of habit is stronger than the best of wills

much may sometimes be accomplished by putting the patient into entirely different mental as well as physical surroundings. Removing the patient from doubtful companions, and from harmful books, inspiring a desire for higher ideas, travelling and living in the country with constant hard bodily work have permanently cured many an inveterate onanist who under the influence of the old conditions strove in vain against impure thoughts and the temptation to commit the act" (Fürbringer.) The modern school with the many subjects to be learned which obliges the scholar to sit for long periods at hard work, and the more luxurious life of towns to-day, which the folly of parents allows the children to share, also favour this vice. The active games mentioned above and gymnastics are excellent against onanism, because they not only supply the lacking exercise, but leave the child no time for impure thoughts. One of the most powerful stimuli, if we omit direct leading astray, is to be found in shops. Look only at the objects displayed in certain drug and stationers' shops, book shops and so-called art shops, and see how eagerly the young gaze on the nudities and obscenities there displayed. One must bear in mind too that such sights affect the child's mind differently from the adult's. Parents have a right to see their children protected from such daily temptation. It is high time that the police authorities should proceed as rigorously as possible against the owners of such shops, undeterred by the outcry of those whose business and profit will be injured when matters become a little more respectable. Onanists who are not too far advanced are often most quickly cured by marriage; but to tie a decrepit old onanist to a healthy young woman is naturally wrong, and to advise an onanist to have illegitimate intercourse is a crime.

Compared with masturbation, other sexual vices are of far less importance. For the danger of masturbation in comparison with coitus is that the former needs no erection, that it is commenced earlier, and from the nature of the case is more intensely practised than coitus. Moreover, we need not consider the consequences of very oft repeated

sexual intercourse as so very harmful, and upon the whole, it may be said that as certain conditions must be fulfilled for coitus, nature no longer fulfils these conditions when the sexual apparatus is strained beyond its functional capacity, and thus makes overstrain impossible. Trivial, temporary injurious effects are certainly not rare as the result of too frequent coitus; but much greater significance must be attached to coitus interruptus than to too frequent cohabitation, and it is one of the commonest causes of certain nervous diseases of the bladder and sexual apparatus.

Lastly, a few words must be added about the use of instruments. When an instrument is to be passed into the bladder, it must be first made as clean as would be necessary were it to be applied to a wound. With the urinary passages the matter becomes somewhat more complicated because the male urethra cannot, as examinations have shown us, be made free from germs by any of the means available. After use, every instrument should be mechanically cleansed with soap, best with soft soap or an alcoholic solution of soap. Catheters and the tubes of irrigation cystoscopes should be syringed out with an antiseptic solution. After the soap is removed by a stream of water, the instruments may then be put into disinfectants, metallic instruments into carbolic acid or lysol, rubber and gum elastic instruments into a solution of corrosive sublimate. Next we sterilize all our instruments in steam which does not spoil rubber articles though they would be destroyed by boiling. Only a few instruments, such as the cystoscope, Kollmann's electrolytic sound and Dommer's faradization catheter cannot be steamed. The cleansed aseptic cystoscope should be kept in the cases introduced by Kollmann, which contain a tablet of formaline and thus keep the instrument permanently disinfected. Other metallic instruments are best kept in well stoppered glass vessels filled with absolute alcohol. For sterilizing catheters with steam, special sterilizers in which the catheter can be suspended so as to allow the steam to pass through it, are very useful but not absolutely necessary. Before introducing the instrument which has been taken from its aseptic receptacle or has been first

made aseptic by placing it for a quarter of an hour in a solution of corrosive sublimate or carbolic acid, the glans penis must be carefully cleansed. If the instrument is to be passed through the posterior part of the urethra, it is well when there is disease of the anterior part to wash out the latter first. In introducing an instrument into the posterior part of the urethra and bladder it is always best to wash out subsequently with a solution of boracic acid.

When there is a tendency to haemorrhage in the urinary passages, it is well if possible to delay passing any instrument until this tendency has subsided; in the same way acute irritative conditions, such as cystitis, are often a contra-indication to instruments, such as the cystoscope. In infective disease of the urethra it is obvious that no instrument must be passed into the posterior urethra unless urgently required, and that all operations on the posterior urethra must be performed with the greatest caution. We cannot here go into further details about the technique of instrumental treatment, because it is assumed that this is already known.

B. Special Prophylaxis

I. The Prophylaxis of Diseases of the Penis (excluding the Urethra)

PHIMOSIS AND PARAPHIMOSIS

Phimosis is sometimes the persistence of a normal condition in childhood, where there is not only a narrowing of the preputial orifice but adhesions between the prepuce and surface of the glans penis are also present. The separation of these adhesions takes place between the eighth and thirteenth years of life. Prophylaxis is obviously powerless to prevent this congenital malformation. On the other hand, the treatment of such a phimosis is prophylactic against other diseases. The phimotic preputial folds in which smegma praeputii collects and decomposes are apt to be the seat of obstinate balanoposthitis, they favour the

development of warts, preputial calculi and carcimona of the penis. In severe cases they may hinder micturition and give rise to urinary obstruction and retention; they may also render coitus impossible because it becomes painful and erection inadequate; they favour the development of onanism through the constant irritation of the balanoposthitis. They predispose to urethral spasm and venereal infection especially with the virus of soft chancres. They may make it very difficult to treat venereal disease when it exists. We cannot give injections or use the endoscope with such a phimosis; soft and hard chancres on the glans and inner surface of the prepuce are scarcely within reach for treatment; gonorrhoea becomes complicated by severe balanoposthitis. Moreover gonorrhoea and primary syphilitic sore increase the phimosis because "inflammatory" phimosis is superimposed upon that already present. "Inflammatory" phimosis may sometimes appear in these diseases though the foreskin is not abnormally narrow. The best preventive of these sequelae is removal of the phimosis. For slight degrees of phimosis when there is no imminent danger, we may attempt to stretch the preputial orifice, for which purpose one of the dilatators introduced by Nélaton and Unna may be used. As a rule, however, operation is required. In only a few cases, can we recommend cutting away of a phimotic prepuce which is too long. As a rule, splitting it along the dorsal medium line, followed by circumcision, is best. The dorsal incision alone leaves two ugly ends hanging down like an apron, often oedematous and easily infected. The general introduction of prophylactic circumcision may be advisable from the medical point of view, but is probably an altogether impracticable suggestion. On the other hand, ritual circumcision when performed should be done by a surgeon and according to modern surgical principles, to prevent infection of the child with syphilis or conversely, the child infecting the operator, especially because of the disgusting sucking of the wound by the rabbi. Tuberculosis also and other infective diseases of wounds may be communicated in the same manner. In incising along the dorsum we must first make sure

that there are no extensive fibrous adhesions between the glans and prepuce; these naturally make this operation impossible. Morever care must be taken not to injure the urethra, especially by the scissors slipping into the urethra by mistake.

When a narrow prepuce is drawn back behind the glans, paraphimosis results, the prepuce cannot again be brought over the glans, and both prepuce and glans become very oedematous. Paraphimosis is especially apt to arise out of inflammatory phimosis. The prophylaxis of these affections is treatment of the phimosis, proper treatment and prophylaxis of venereal disease, and prophylaxis of onanism which often is a direct cause of it.

The male genitals may also be affected by almost any skin disease. There is nothing special about these and we refer the reader to the section on skin diseases.

ECZEMA

Eczema of the genitals may appear in the acute or chronic form and affect the body of the penis, scrotum, scroto-crural fold and neighbouring abdominal and femoral regions; while true eczema of the glans or prepuce is extremely rare compared with balanaposthitis which is so common. Prophylaxis consists in the avoidance of certain forms of irritation which experience has taught may produce eczema. First, we must mention the irritation produced by parasites on the skin, by intestinal parasites, by diabetes mellitus, haemorrhoids and the constant action of certain irritants, such as paraffin, turpentine vapour and soot. But the irritation and eczema may persist long after the cause is removed, and direct treatment is therefore required. A further avoidable cause is the accumulation of decomposed substances on the skin, such as perspiration, sebum, and urine. Singly or in combination, they are apt to give rise to intertrigo, especially in small children and fat people, and this may be prevented by keeping the genital regions clean, by washing daily with a mild soap and whenever the parts become wetted with urine, and afterwards dusting with some inert powder. This is more

difficult whenever the parts are constantly wet with urine, as in congenital malformations (*Ectopia vesicae*), urinary fistulae and in incontinence of urine. In these cases when the primary disease cannot be removed, receptacles for the urine should be used. The parts wetted with urine should be washed with a mild soap; instead of powder some protective ointment should be used, one which contains lanolin, and the addition of a mild disinfectant, such as salicylic acid, benzoic acid or boracic acid is best.

BALANITIS AND BALANOPOSTHITIS

Inflammation of the glans and of the inner surface of the prepuce is produced by accumulation of decomposing matter in the preputial sac, generally smegma praeputii, epidermal débris and the secretion of Tyson's glands. The accumulation may be caused in several ways, but uncleanliness is the chief. When there is sexual anaesthesia or sexual inactivity for any reason, and where the mechanical cleansing by coitus fails, enormous quantities of smegma praeputii may sometimes be seen. These cases are easily cured by washing regularly with soap and water. But foreign bodies, preputial calculi, tumours such as venereal warts may also cause decomposition, and it can be cured by removing them. With venereal warts there is a tendency to recurrence, and any existing gonorrhoea should be thoroughly treated. Conversely warts may arise as the result of long standing balanitis. These conditions are much favoured by a prepuce which is both long and narrowed. Circumcision is therefore excellent in these cases. In very long prepuces the anterior part of the prepuce should be removed; dorsal incision and splitting of the inner layer of prepuce do not suffice. The general introduction of ritual circumcision, as has been proposed by some, is out of the question. Those who have been circumcised hardly ever come for medical advice for balanoposthitis. Diseases of these parts accompanied by hyperaemia and hypersecretion of the prepuce, which are produced by bacteria or which favour the invasion by bacteria, such as gonorrhoea, soft and hard chancres, are

very apt to produce balanoposthitis, which may become serious through swelling of the prepuce and the development of inflammatory phimosis. They may be prevented by cleaning the preputial sac from inflammatory secretions, or if there is phimosis by the injection of mild disinfectants between the glans and prepuce by means of a syringe, or by operating to cure the phimosis.

Sexual excess does not readily give rise to balanoposthitis and onanism never causes it. Lastly, there are men who have a special predisposition to balanoposthitis, who regularly get a fresh attack of their trouble after every coitus, after a walk in warm weather, after any slight mechanical irritation or an exacerbation of decomposition.

We must also mention patients with diabetes, in whom these organs when wetted with urine afford an excellent nutritive medium for bacteria. In these cases the greatest cleanliness is required as a prophylactic ; the parts should be washed daily and sprinkled with powder; but in some cases where there is great sensitiveness to irritation, washing must not be overdone ; these cases of balanitis are closely allied to eczema, and often they will not permit of the use of water and must be powdered over daily after the old powder has been removed. We have seen cases where only a little powdered talc was tolerated without any addition of salicylic acid or starch or zinc oxide, or even dermatol. These patients have sometimes a very liquid smegma which Finger has found to be very irritating. In these cases desiccating powders are best.

HERPES PROGENITALIS

As a prophylactic against this genital affection onanism should be forbidden when it is the exciting cause. There is no object in forbidding coitus. As the trouble depends upon a greater irritability of the nerves, it follows that at an age when strong stimuli affect these regions there is not much to be done as a prophylactic. These affections require very careful treatment not only because, like all wounds, they may afford an occasion for the entry of the ordinary infective diseases of wounds, but more especially

because they make it easier for syphilitic and venereal poisons to enter, and unmarried patients should therefore be told of the great danger to which they expose themselves by impure coitus before these wounds have firmly healed. This statement is the more important because these affections stimulate sexual feeling.

PRIMARY SYPHILITIC CHANCRES AND SOFT SORES

In the general part the measures were given which the individual and the State should carry out to prevent the spread of venereal disease. For the prevention of specific infection of the genitals we need merely mention the necessity for sexual abstinence by the unmarried and the harmlessness of sexual abstinence, and also that venereal infection may not only be conveyed by regulated prostitution but even more so apart from it. The best prophylactic against all sexual infection is naturally the avoidance of all impure coitus. But as we must take men as they are, we must be able as doctors to help them too when they ask us how with least danger to themselves they can have such sexual intercourse. In reply to this question we advise the use of condoms or the penis may be smeared before coitus with some boracic ointment. Subsequent washing with soap removes the infective material with the ointment. This use of ointment is useless against gonorrhoea. There is no greater value in subsequent disinfection than there is in an ordinary washing with soap.

PERIURETHRITIS, CAVERNITIS, URINARY EXTRAVASATION, URINARY ABSCESS, GANGRENE AND CELLULITIS

With the exception of the few cases which are caused by external injuries, these originate exclusively in affections of the urethra and prostate. We refer the reader to what has been said in the general part on catheterism and the passing of bougies, and to the chapters on "Gonorrhoea," "Prostatitis," and "Stricture."

NEW GROWTHS OF THE PENIS

The commonest form of new growths of the penis is the venereal wart on the glans and prepuce. They are as a rule either the result of balanoposthitis and to cure these conditions by operation for the phimosis or by removal of preputial calculi is of prophylactic value, or they have been caused—and this is true of the majority of cases —by long persisting gonorrhoea. The prophylaxis and treatment of gonorrhoea is therefore at the same time the best prophylaxis of the warts and is indispensable to their cure. Sometimes these growths cause lymphangitis and even superficial ulcers of the prepuce; in other cases when they have existed long, they predispose to cancer of the penis. In removing them we have to remember their tendency to recur. Whichever method of operation is selected (whether knife, scissors, sharp spoon, Paquelin cautery or electric snare) care must be taken that the base of the tumour is well cauterized by heat or caustics, such as liquor ferri perchloridi. Very small warts may disappear when the preputial sac is kept dry by some inert powder or when cauterized with powdered savin. Prophylaxis may also be employed for another new growth, carcinoma. The necessity of removing warts has already been mentioned; and it is equally important to remove cutaneous horns. But phimosis and the irritative conditions caused by it are generally concerned in the aetiology of carcinoma. Demarquay states that in fifty-nine cases of carcinoma of the penis forty-two were associated with phimosis, and Travers states that circumcised Jews never or only exceptionally suffer from carcimona of the penis.

II. The Prophylaxis of Diseases of the Urethra

Urethritis

1. GONORRHOEAL URETHRITIS

Among inflammations of the urethra gonorrhoea occupies the chief place. It is the most widespread infective disease of early manhood. It is more insidious than syphilis because, even more than is the case with syphilis, it heals only superficially, and the patient is troubled and threatened with it again for years afterwards, and because the patient remains infectious longer than with syphilis. The necessity referred to in the general part of spreading a knowledge of venereal disease and its consequences among the people is especially obvious in the case of gonorrhoea. With regard to the general prophylaxis of gonorrhoea reference should be made to the statements in the general part about the prophylaxis of venereal disease ; and for special prophylaxis to the chapter on " Primary Syphilitic Affections and Venereal Ulcers." To protect against gonorrhoea too the condom is the only serviceable means. All dropping and syringing apparatus recommended by Neisser, Frank and others, and very well planned, afford protection against gonorrhoea only, and not at the same time against the infection of syphilis and soft sores. Obviously, neither method enables the patient to dispense with washing the parts and more especially the prepuce with soap and water. For no other disease of the urogenital apparatus can we speak so readily about a " prophylaxis by treatment," as we can in the case of gonorrhoea. In one case, treatment enables us to prevent the individual from infecting others ; in another case, to prevent the development of chronic gleet or the development of complications and serious sequelae. There is even to-day a diversity of opinion as to the treatment to be adopted in gonorrhoea. And yet an agreement between the contending methods is quite within the range of possibility.

Gonorrhoea is an infectious process produced by a special microbe, and its course in the infected human being follows

the laws of many infective diseases. There is no immunity against the disease even if we exclude those cases mentioned by some in which a second more serious gonorrhoea has been acquired after a first gonorrhoea had been cured. We must bear in mind too that the gonococcus has become firmly lodged in the epithelium a few hours after it has reached the urethra, that one to two days after infection it may be found deeply placed even below the epithelium, and that it at once infects the various glands of the urethra. Our bacteriological knowledge of to-day requires us when treating any infectious disease to use either a preparation which directly kills the parasites, as quinine in malaria, or which gives the body time and opportunity to overcome the parasite, for instance antitoxin in diphtheria. In the treatment of gonorrhoea both principles have been applied. A number of preparations have been recommended which have this property in common, that they kill the bacteria; but the bactericidal property of these varies greatly. Among the weaker substances are zinc sulphocarbolate, thallin sulphate, boracic acid and potassium permanganate; among the stronger, corrosive sublimate, resorcin and the salts of silver. The latter, more especially the silver salts, have been extensively used of late years. Some have ascribed remarkably valuable properties to salts of silver, especially to protargol, while others have denied their value just as energetically. It seems to us that the organic salts of silver, more especially perhaps protargol, are very useful because they very quickly reduce the number of gonococci and make them less virulent; but we cannot believe in the mysterious "deep effect" of protargol. No solution of a drug of a strength which can be used penetrates deeply enough to kill bacteria which are situated in the subepithelial layers. Either the substance is not absorbed or but very slightly, and kills no gonococci, or else it is extensively absorbed and will then destroy the cells of the tissue in and between which the gonococci dwell. But probably no fluid injection penetrates into the infected glands. The only remaining alternative logically is some selective deep action of protargol, and if we cannot accept this we are obliged to give up any theory

to explain the action of silver salts; presumably however it is bactericidal.

In the early stage of gonorrhoea, injections with bactericidal substances are permissible only because they in no way prevent nature's efforts at healing. The result of the invasion of the deeper layers of the epithelium by gonococci is an enormous leucocytosis from the vessels of the subepithelial layer towards the free surface of the mucous membrane, and the object of this leucocytosis is to eliminate the gonococci directly or after they have been weakened or destroyed by the fluids of the cell. To prescribe astringents such as zinc sulphate at this stage is therefore a fundamental error, because it checks the salutary leucocytosis. That antiseptic is best at this stage which is least astringent. Proceeding from this standpoint many physicians do not allow their patients to syringe during the first few weeks when there is thick purulent secretion and subjective symptoms, and certainly without any bad results. By about the third week, a time when the subjective symptoms have mostly disappeared, and the secretion begins to be more mucous, an important process has taken place inside the urethra; those parts of the urethra which were covered with cylindrical epithelium have under the influence of the inflammation become covered with pavement epithelium. With this the best soil for the growth of the gonococcus has gone, and it now thrives but poorly upon the surface of the mucous membrane. Astringents may now be used because there are no more gonococci in the deeper parts to be eliminated by the leucocytes, and those astringents are best which at the same time kill the gonococci; the most useful solution for this purpose is one of silver nitrate of the strength of 1 in 3,000 to 1 in 1,000. The nearer the disease approaches its last stages the less the significance of the gonococcus in the catarrh, the more suitable are the astringents such as potassium permanganate, ichthyol and copper.

The longer the acute process is prolonged, and the more it is neglected, the greater are the chances that the migration from the vessels, the tendency to new growth of the connective tissue, and the proliferation of the epithelium will

become permanent; thus arise those cases of inflammatory hyperplastic tissue which by retrogressive changes lead gradually to disappearance of the vessels and sclerosis of the connective tissue, that is to scar formation. What is termed "chronic gonorrhoea" or "gleet" is clinically sometimes a simple catarrh, sometimes a severe organic stricture. These are, as Oberländer and Nilsen have shown, identical pathologically and anatomically, the difference is only one of degree. Our chief modern remedy for chronic infiltration is massage. What this does for muscles, ligaments and joints and for other organs infiltrated with inflammatory products, it can do too for chronic infiltration of the urethral mucous membrane. For every case of gonorrhoea which has passed the acute stage, massage, that is stretching of the infiltrated mass, is indicated. This is done by taking a number of sounds of various sizes and passing them into the urethra at intervals of several days. A supply of straight and curved sounds is needed, and the surgeon may with advantage use the dilating instruments designed by Oberländer, Kollmann and others.

We cannot here enter into the question of the method in which they should be used. Full descriptions of these are given by Oberländer, by Wossidlo, and by Dommer. We need only say that all dilating apparatus should stretch the parts gradually, not abruptly, and that the intervals between applications must be considerably longer than is necessary when simple sounds are used; further, that we can combine dilatation with irrigation (irrigating dilators), that in addition to and in the intervals between dilating, treatment by injections and irrigation is required with solutions, which act sometimes as antiseptics, sometimes as astringents, sometimes only mechanically removing mucus, pus and secretions. The field for mechanical dilatation treatment of gonorrhoea is in conditions where there is much infiltration; here it is the chief remedy. Infiltration and disease of the glands cannot be removed by any chemical preparation, at least not so quickly, completely and certainly.

It is for chronic gonorrhoeal cases that the endoscope is useful; when used by skilled hands it enables us better

than does any bougie or sound to detect local changes in the bladder and to observe the course of disease and whether it is healing. Moreover it is only possible with endoscopic illumination to incise or remove inflamed urethral glands; experience shows and theoretical considerations bear it out that the gonorrhoeal process is often most intense in these glands. It is absolutely essential therefore at the present time that every surgeon who treats disease of these organs should possess a urethroscope, and be familiar both with its use and with the interpretation of the appearances which it reveals. The best instrument is the Nitze-Oberländer; no other instrument is able to give such an effective illumination.

It is not our duty to describe the treatment of gonorrhoea exhaustively. We have only stated the guiding principles of the treatment to be adopted. Treatment by the methods indicated is the best prophylaxis against the development of chronic gonorrhoea of the anterior and posterior urethra, of stricture and of certain nervous diseases.

In the treatment of acute gonorrhoea we must also apply prophylactic measures for the prevention of complications. Such complications are posterior urethritis, cystitis, prostatites, cowperitis, spermatocystitis, deferentitis, epididymitis, paraurethritis, periurethritis, and further pyelitis, secondary nephritis, gonorrhoeal rheumatism, gonorrhoeal conjunctivitis and proctitis, endocarditis, and pyaemia. Prophylaxis of these consists in observing various hygienic and dietetic rules, which the physician should never omit to give to the patient. The patient with gonorrhoea must (1) avoid everything which would unnecessarily irritate the urinary passages. Among these are highly-spiced dishes, alcohol in every form, and sexual excitement. In the second stage of acute gonorrhoea, when in the normal course gonococci only grow upon the free surface of the pavement epithelium, irritating urine may produce fissures and rents in the epithelium, through which the gonococci can then again penetrate to the deeper parts. (2) The diseased urethra must be given as much rest as possible. For this reason treatment in bed is best for gonorrhoea,

but is unfortunately not often practicable. The patient must at least be forbidden all movements which would enable the pus to pass more easily into the posterior urethra, such as walking, driving, and dancing, and coitus. The patient should also be taught how to use the syringe, which should not be too large. Every patient with gonorrhoea should wear a well-fitting suspensory bandage which will not drag on the scrotum; this will diminish the danger of deferentitis and epididymitis. (3) The greatest cleanliness must be observed to prevent the patient from further infecting himself. For this reason a piece of wool should be placed in front of the orifice of the glans; it may be sewn into a bag in front of the suspensory bandage. The soiled wool should be burnt, the genital regions washed daily in a bath with soap, the hands washed with soap every time after touching the genitals, or with an alcoholic solution of soap, In this way it is generally possible to avoid the complications mentioned above. All complications cannot be avoided in this way; for most there is no absolute guarantee. But with due precaution many may be prevented. The treatment of complications belongs to therapeutics. We will merely here state that if periurethral or follicular inflammation develops, all local treatment for gonorrhoea must be discontinued, and the inflammation treated by rest, by raising the parts, by diet, and counter-irritants applied to the perineum; but if the process tends to the formation of an abscess, the abscess must be incised early to permit of the escape of the pus. In this way urinary abscess, extravasation of urine, cellulitis, and fistula are best prevented. In cowperitis the abscess should be incised as soon as it has formed, and one should not wait till there is fluctuation, because this is very difficult to obtain through the fasciae, and time is thereby allowed for extensive abscesses to develop.

When may treatment for gonorrhoea be discontinued? Not when there is no longer any discharge and subjective symptoms have disappeared; not even when

repeated examinations no longer reveal gonococci; but when the infectious catarrh is over, when it is completely healed. In this respect the same pathological, anatomical and clinical rules hold good for this, as for every other infectious disease of any organ. Sooner or later the body will eliminate the dead parasites. Only in inaccessible places where, in consequence of special organic conditions, the natural powers cannot accomplish this, can the infective material be longer concealed. Generally however the catarrh loses its specific characters long before it finally disappears. The microbes of mixed infection survive the specific organism, and the organic changes in the epithelium, the glands and subepithelial structures may remain and even show tendencies to progress long after all gonococci have disappeared; the patient is not yet well and liable to the dangers of the sequelae. Therefore it is not only necessary that repeated examination should no longer show any gonococci; secretion must have ceased, and the epithelium, glands and subepithelial tissues must have returned again to their normal condition. A complete *restitutio ad integrum* can certainly not always be ensured. As in the case of catarrh of other mucous membranes, so too in gonorrhoea, especially in chronic gonorrhoea, there remains a tendency to a watery secretion, from the epithelium and the glands, and the infiltration of the mucous membrane cannot be removed when fibrous changes are far advanced; we can then only treat the effects of the more recent inflammation, so that, as Oberländer expresses it, a "dead scar" remains. To determine whether cure in the clinical sense has occurred, the endoscope is of invaluable service and cannot be replaced by any amount of skill, or other methods of examination.

2. NON-GONORRHOEAL URETHRITIS

The occurrence of a urethritis which has not been produced by the gonococcus is a fact which the experience of every surgeon confirms. The most different causes—mechanical, chemical and bacterial—may produce urethral inflammation. Among mechanical causes are foreign

bodies put into the urethra by onanists or in play by children, urethral calculi, want of skill in passing the catheter or bougie, rapid dilatation, and the self-retaining catheter. To these belong also those changes in the posterior urethra which are the result of masturbation and especially affect the veru montanum, producing changes with subjective symptoms and objective changes in the urine. Chemical irritation has not only been experimentally proved to be possible, but we see it daily in gonorrhoeal patients who have introduced strong corrosives in solution or in the form of urethral bougies into the urethra. Urethritis caused by bacteria is much more common than is generally assumed, although Bockhardt has only succeeded in one case in infecting a second human urethra with the microbe discovered; the significance of other bacteria which have been found is not certain, and no bacteria are sometimes found in cases of disease which must from their clinical course and history be regarded as infectious. We are of course not here thinking of the "urethritis" which is the result of urethral tuberculosis, venereal sores, herpes and malignant disease of the urethra. Non-gonorrhoeal urethritis, like the gonorrhoeal form, develops as a rule after coitus; only it is not the gonorrhoeal poison, but some unknown poison or poisons which produce the effect. It would seem that the vagina may be infectious, particularly at the time of menstruation. Other cases of infectious urethritis have been caused by catheters and bougies which were not aseptic. The clinical course of these different kinds of urethritis is very different. Those forms of urethritis which are produced by mechanical and chemical causes give rise to a muco-purulent or purulent secretion, lasting a few days. Urethritis which owes its origin to misuse of the genitals assumes a chronic character; and infectious urethritis may be progressive, may attack the adnexa as true gonorrhoea does, and take months or more to heal. In cases of gonorrhoea which have been cured, sexual exertions often cause acute exacerbations in which gonococci are not found. But we do not

think the possibility of nongonorrhoeal urethritis must be excluded because the patient has had gonorrhoea; otherwise, the great frequency of gonorrhoea would of itself do away with the diagnosis of non-gonorrhoeal urethritis. For, on the one hand, when there is gonorrhoea, injections and dilatations may cause a urethritis due to the irritation, or a non-gonorrhoeal infective urethritis may develop; on the other hand, the fact that the patient has formerly had gonorrhoea does not exclude non-gonorrhoeal urethritis when the bacterial and clinical examination no longer show any traces of gonorrhoea. The prophylaxis of non-gonorrhoeal urethritis is self-evident after what has been already said. It consists partly in the rules we have already given for the sterilization of instruments, for catheterization, and in the treatment and prophylaxis of gonorrhoea and onanism. Prophylaxis also requires that we should watch over the games of children, and that, as is self-evident, coitus should not occur during the menstrual period. The prophylaxis of urethritis caused by urethral calculi is similar to that for urinary calculi. The treatment of these non-gonorrhoeal forms of urethritis is prophylactically important, because they may be followed by secondary vesical and renal troubles, disease of the adnexa, severe strictures and nervous disease.

STRICTURE OF THE URETHRA

Congenital strictures of the urethra are hardly cases for prophylaxis; they cannot be prevented, and it is only the severer forms, where there is complete atresia, which give rise to conditions which make a prophylactic operation essential. The neurotic, spastic "strictures" will be described in the chapter on "Nervous Diseases of the Genito-Urinary System." Of the acquired strictures, the chief interest attaches to those caused by traumatism and gonorrhoea. Traumatic strictures are mostly the result of injury of the posterior part of the urethra, and should be prevented by properly treating the injury and by the

regular use of bougies for a long time after the wound has healed. Gonorrhoeal strictures, which may be situated at any part of the urethra, occur most often in the anterior part, which is the favourite seat for chronic gonorrhoea, and the best prophylaxis is proper treatment of the gonorrhoea. We would therefore refer the reader to the description of the prophylaxis of gonorrhoea. Certainly, unsuitable treatment of the urethra—for example, the injection of strong corrosives may lead to the development of strictures; but as a rule it is inadequate treatment of gonorrhoea, or, to put it more correctly, neglect of any treatment of chronic gonorrhoea which produces stricture. Histological and endoscopic examination shows that a stricture is nothing more than an excessive degree of infiltration into the mucous membrane produced by the chronic gonorrhoea. The measures adopted to prevent stricture must be such as will cause the exudation to be absorbed and prevent it from being converted into fibrous tissue. Mechanical treatment will accomplish this, and the method devised by Oberländer is the best, in which the endoscope plays an important part in the treatment. We are entirely of the same opinion as Wossidlo, who says: "This (that is, prevention of the small celled infiltration from becoming converted into fibrous tissue) can only be done if the various phases of gonorrhoeal infiltration are carefully watched by means of the urethroscope and treated accordingly. The urethroscope alone renders it possible for us to make a scientific differential diagnosis of the diseased foci and of the stage of their development." The fact is that at the present time in most patients who have been cured of gonorrhoea, strictures of larger or smaller size exist. And it is a fact, too, that these would not be there if treatment by dilatation had been used assisted by the use of the endoscope. Strictures of the severer grades produce a number of secondary diseases. The prophylaxis of the latter consists in the treatment of the strictures. We cannot here go into further details about the method of treatment of strictures. All effectual methods aim at making a passage for the urine through the contracted urethra, and at rendering permanent any dilatation

thus effected; and indeed, when possible, to remove the exudation and restore the urethra to its normal condition, and thus prevent relapses. If the stricture is so firm that it cannot be dilated, a new outlet must be made for the urine. In the treatment of chronic gonorrhoea, dilatation should, if possible, be very gradual; but in very narrow strictures it may be better, when a bougie has been introduced, to leave it in. So, too, in cases where passing a bougie always causes a rise of temperature, or the stricture is so sensitive that no narcotic removes this sensitiveness. In introducing a "permanent" catheter, strict asepsis must be observed. It is best to let the end of the india rubber tube put on to lengthen the catheter pass into a vessel containing a disinfectant. The "permanent" catheter should not pass much beyond the neck of the bladder into its interior, because experience teaches us that "pressure ulcers" in the bladder are apt to form, especially when there is already cystitis. As a rule, it is sufficient to leave it in for twenty-four to thirty-six hours, and if we want to avoid cystitis and pressure ulcers it must in no case be left in longer than two or three days. Urethrotomy must be substituted for treatment by dilatation when the passage through the urethra has to be quickly restored, when the stricture offers too great resistance to dilatation, and when treatment has to be shortened because urethral fever sets in on every occasion. Internal urethrotomy as a rule suffices. External urethrotomy is necessary when the bougie of the urethrotome cannot pass, when there is a traumatic stricture, and when a free outlet must be made for the urine in cystitis, contracted bladder, or nephritis. It is also indicated in a very narrow stricture which is difficult to dilate, when the stricture is complicated with multiple urethral fistulae, urinary infiltration, and false passages, and in complete retention in impermeable stricture. In both operations a catheter must subsequently be inserted and left in, for one or two days in internal urethrotomy and for three to four days in external urethrotomy, to prevent extravasation of urine. But this must be omitted if the patient is very sensitive and the

bladder is diseased, as when there is weakness of its walls, ulceration, or a tendency to haemorrhage. Among complications and sequelae of stricture, prophylaxis is important where there is inflammation and distension of the urethra behind the stricture. In these cases dilatation of the stricture is essential; but when there is inflammation of the stricture, care must be taken lest complete retention of urine sets in. If the inflammation behind the stricture is not removed, abscesses form in the scar tissue and ulcers in the wall with their sequelae: urinary infiltration, urinary abscess, and urinary fistulae. These may be caused too by follicular abscess and injury with the catheter or bougie. Moreover, as the result of these strictures, disease of the bladder (cystitis and irritable bladder), of the ureter (dilatation or ureteritis), of the renal pelvis, calices, and parenchyma (hydronephrosis, pyelitis, and pyelonephritis), and orchitis and epididymitis may appear; and all these might have been prevented by curing the stricture. In treating strictures we should also avoid urethral fever, which must certainly be looked upon as septic in origin. This is best prevented by great gentleness in operating on a urethra with a stricture, by using sterilized instruments and by previously disinfecting the urethra. Other diseases which exist at the same time in the urinary system should be treated. Patients with renal disease not only bear catheterization badly, but their nephritis is increased and urethral fever runs a more severe course, because the defective kidneys do not so well eliminate the products of the fever. For the dilatation of strictures in patients with renal disease, we would therefore select that method which acts most quickly. The prophylaxis of urinary fever after urethrotomy requires, as was stated above, that a "permanent" catheter should be inserted. The bowels should be well opened before the operation, the patient should be well covered up to prevent taking cold, and after the operation he should be given a large amount of liquid to dilute the urine.

URINARY FISTULA

The prophylaxis of urinary fistula consists in appropriate treatment of urethral wounds and peri-urethritis; this has already been dealt with in the chapters on "gonorrhoea" and "stricture."

NEW GROWTHS OF THE URETHRA

So far as concerns prophylaxis, warts are alone of interest. What has been already said about the warts of the penis is applicable.

III. The Prophylaxis of Diseases of the Bladder

MALFORMATIONS OF THE BLADDER

Prophylaxis against malformations of the bladder, in the sense of prevention, is of course not possible, or belongs to prophylaxis during pregnancy. When the malformation already exists—and this applies only to ectopia vesicae—surgical interference to close in the bladder or afford some other outlet for the urine is the prophylactic treatment required to prevent eczema, which otherwise is sure to appear, and pyelonephritis, which develops as the result of an ascending infection.

CYSTITIS

If, accepting the modern teaching, we assume that cystitis is always of microbic origin, it is nevertheless certain that the bacilli are in themselves as a rule harmless to the bladder. Purulent processes in the upper urinary passages, a perforating abscess in the vicinity, and infective processes in the prostate and hinder part of the urethra are often well borne for a long time, until some trauma is added, and cystitis then rapidly develops. On the other hand, aseptic trauma by itself will not set up a cystitis, but only a catarrh of the bladder. This is explained by the great power of resistance possessed by the epithelium of the bladder, and the constant physiological evacuation of its contents, which does not so easily permit of the lodgment of microbes. But

when the epithelial continuity has been broken, when some congestive condition has appeared in the bladder or the contractility of the bladder is diminished, then microbes can effect a lodgment and cystitis develops. The prophylaxis of cystitis may therefore follow two lines, namely: avoiding (1) all trauma, and (2) all infections of the urinary passages. Either form of prophylaxis must be the more energetically carried out when the other factor is already present.

1. The traumata which may affect the bladder are of very varied nature, if one does not limit the term within narrow limits surgically. They may be chemical and are then, as a rule, caused by poisons taken into the body and eliminated with the urine. The inflammatory process is then not confined to the bladder but affects other parts of the urinary system, especially the kidneys. If we exclude a few ethereal oils and resins, such as balsam of copaiba and turpentine, we need only consider cantharides taken by the mouth or used as plaster, which in consequence of the increased power of absorption by the injured skin acts so as to produce inflammation in the urinary passages. The sugar in diabetic urine and the urine in chronic nephritis, if at the same time it contains much uric acid, may likewise produce cystitis. The prophylaxis of these forms of disease consists in proper care in avoiding all drugs which irritate the urinary passages, in prophylaxis of the diabetes or of the nephritis, for which reference should be made to those chapters.

Direct mechanical injury to the bladder, if we omit severe bruising and rupture of the bladder walls, which belong to surgery, is more especially caused by catheterization. It is certain that no less stress is to be laid upon the mechanical injury by catheterization than upon the danger which all acknowledge of introducing germs with the catheter. Daily experience teaches us that the catheter may be passed for long periods by a surgeon or by the patient under conditions of doubtful asepsis without doing any mischief, but that cystitis quickly sets in when in a case of retention of urine the catheter is employed by un-

skilled hands. While referring the reader to the general part for the prophylaxis of catheterization, we would advise that for self-catheterization a soft rubber catheter only should be permitted, and also that surgeons who have not much practice in passing the catheter should, in cases of retention of urine, first try a soft rubber instrument because no injury can be done by it. Other injuries are produced by the rough passage of instruments in urethroscopy and cystoscopy and lithotrity—especially in the posterior part of the urethra—and special care must be taken in all chronic inflammatory conditions of this part of the urethra lest these be rendered again acute and thus extend to the bladder. The vesical mucous membrane may also be injured by vesical calculi, but especially by pieces of calculi left behind after crushing. But calculi may remain in the bladder for a long time and injure it and yet no cystitis develops.

The prophylaxis of these injuries consists in the prophylaxis against vesical calculi, against foreign bodies in the bladder, seeing that children do not introduce foreign bodies in play, and in the prophylaxis of onanism.

Next to injury produced mechanically comes retention of urine. This may be caused by different conditions—by stricture of the urethra, by atrophy or hypertrophy of the prostate or of the musculature of the bladder. It may be due to calculi and tumours in the bladder, to acute inflammatory processes in the region of the neck of the bladder, to displacements and tumours of the uterus, or to pregnancy. Lastly it may be caused by trophic changes in the mucous membrane and paralysis of the vesical walls as a result of spinal or cerebral processes. It is less in the acute and the chronic forms of complete urinary retention than in the chronic forms of incomplete retention that regular and early catheterization under conditions of strict asepsis is of the greatest use as a prophylactic. A large number of such chronic incomplete forms of retention may be cured by regular catheterization. In cases of excessive distension of the bladder the urine should not be all removed at once, but only in the course of a few days, so that

the bladder may be gradually accustomed to it. It would seem that incautious catheterization may stir up a renal affection hitherto latent and cause it to progress. Under such conditions the entire urinary apparatus may become congested and an infection rapidly spread over the whole. Retention of urine relaxes the epithelium, causes congestion of the mucous membrane, and thus prepares an easy way for infection. The part played by retention in causing cystitis has been best shown by the classical investigations of Petersen and Guyon, which are complementary one to the other. Both succeeded in producing cystitis in animals when the ureters were ligatured and infectious matter put into the bladder, but Petersen could not produce cystitis by simply ligaturing the ureters, nor could Guyon by only injecting microbes. To prevent retention, the cause must be avoided or treated. For the prevention of urethral strictures, reference should be made to the chapters on "gonorrhoea" and "stricture." For the prophylaxis of retention caused by prostatic disease, by stones, and by vesical tumours, we refer the readers to the sections on those subjects. The prophylaxis of retention due to tumours and displacements of the uterus, and to spinal and cerebral disease, has been given in other parts of this work. Any great and neglected retention will lead to further changes in the urinary passages, and apart from the cystitis which will eventually develop, will lead to hypertrophy of the musculature of the bladder, to the formation of sacculi, to overdistension and atony of the bladder, to dilatation of the ureter, hydronephrosis, pyelitis, pyelonephrosis, uraemia, and pyaemia. The relief of such a retention and the removal of its cause are therefore prophylactic measures of great importance.

Independently of retention, congestive states of the bladder may predispose to cystitis. Disease of the internal female genital organs, of the pelvic connective tissue and of the peritoneum may, as the cystoscope shows, produce congestion of the neighbouring vesical wall. For the prevention and treatment of these, reference should be made to the corresponding sections.

2. Vesical infection takes place in several ways. Most of the infections proceed from the urethra. Catheterization, the passing of bougies and cystoscopy with instruments which are not aseptic, carry various infective agents into the bladder; if there already exists some trauma, as pointed out above, infection of the bladder is easier. It is said moreover to be possible to carry into the bladder by aseptic instruments pathogenic germs which are present in the urethra and thus produce cystitis; as a matter of fact, several pathogenic micro-organisms have been shown undoubtedly to be present in the healthy urethra. But whether these can produce cystitis in such individuals has not been determined by experiments made with these microbes on a healthy individual. We are inclined to think that these bacteria are no longer virulent and live a saprophytic life, and this assumption is supported by analogy from bacteriuria.

The case is otherwise with a diseased urethra. The investigations of Petit and Wassermann show that such a urethra is not free from germs even when after micturition it has been washed out with disinfectants for half an hour. It follows therefore: (1) that, when the urethra is diseased, as little as possible should be done by intra-vesical methods. (2) If intra-vesical methods cannot be avoided, we should do what we can first to wash out the urethra thoroughly. The greatest share of infections of the urethra belongs to gonorrhoea, acute or chronic. Prevention and adequate treatment of gonorrhoea is therefore the best prophylaxis against this form of cystitis. We refer the reader to the chapters on "gonorrhoea" and "strictures," and would here only specially warn against errors in diet, against the injection of substances which are too strong, and against careless injections. For although the sphincter of the bladder reacts promptly to injection when no acute inflammatory condition is present in the urethra, we must not expect the same reaction when there is inflammatory infiltration of the mucous membrane or alteration in the muscle substance. Above all, we must not omit to advise the patients to live very carefully when

improvement sets in; experience shows that this is the time when, through some thoughtless action of the patient, most complications appear. For tuberculous inflammation, see the chapter on "urogenital tuberculosis." From the urethra, infective material may pass into the bladder in women, where the shortness of the urethra makes such infection much easier. We will only briefly refer to the vulvovaginitis of young girls which has been mentioned elsewhere, the cystitis in women with displacement of the uterus and consequent gaping of the urethra, and the cystitis of old women arising from retrogressive changes in the genitalia which make the urethra patulous. Incompetence of the sphincter in the male may sometimes come into consideration in spinal and cerebral affections.

Comparatively few cases of infection of the bladder proceed from the ureters or kidneys. The extension to the bladder of purulent nephritis and of calculous pyelitis, or of renal or ureteral tuberculosis, will be spoken of in the sections on "urinary calculi" and "urogenital tuberculosis." But even when the kidneys are little or nor at all diseased, experiment and clinical experience teach us that pathogenic germs may pass out of the circulation and get into the bladder and may there set up cystitis if the conditions in the bladder are favourable to it. Such cystitis is met with in infective diseases, such as scarlet fever, and disease of the intestine, especially inflammation, intestinal obstruction and constipation. Both forms are met with chiefly in children. Experiments by Lewin and Posner upon animals seem to confirm this. Doubtless many cases of "idiopathic" cystitis belong to these classes. Zuckerkandl is inclined to think that cases of cystitis "from cold" are of the same origin, but this is not yet certain. The same writer also thinks that cystitis is of haematogenous origin in many cases of spinal affection with incomplete retention of urine and chronic intestinal paresis. The prophylaxis of these forms of cystitis is the prophylaxis and treatment of the primary disease, and these are given in other parts of this work.

Lastly, there are the rare cases of direct infection of the

bladder by tubercle bacilli from a caseous focus, and by direct migration of germs (not through the circulation but through the tissues) from a purulent process in the intestines and female genitalia, and by the bursting of abscesses through the bladder wall. The prophylaxis of these forms of cystitis also consists in the prophylaxis and treatment of the primary disease, and is therefore dealt with elsewhere.

Every case of cystitis requires careful treatment. This cannot here be further dealt with; its aim is to remove the cause, and if possible also the changes that have taken place; in acute cystitis this treatment is the best prophylaxis against chronic cystitis, and in both forms it is the prophylaxis against the serious complications which may occur.

For vesical tuberculosis, see urogenital tuberculosis. For retention and incontinence of urine, in addition to what has already been said, see under "hypertrophy of the prostate." For vesical neuroses, see nervous diseases of the genito-urinary tract. For foreign bodies in the bladder, see above under cystitis. For vesical calculi, see the chapter on "urinary calculi."

VESICAL TUMOURS

Practically we have only to consider papilloma of the bladder and carcinoma. The latter may extend secondarily to the bladder, and early operation for carcinoma of the prostate, uterus, ovary or intestine is therefore the best prophylaxis against the development of a vesical carcinoma. Primary or secondary vesical carcinoma, when once developed, is no longer of much interest from the prophylactic point of view. The prophylaxis of primary vesical cancer, which is very rare, consists as far as any prevention is possible in the removal of everything which might be a source of irritation to the bladder for any length of time, such as chronic inflammations, vesical calculi and vesical parasites. The fact should also be borne in mind that those who make fuchsin and have to do with anilin and toluidine, often get vesical cancer, but prophylaxis against this is not possible. The direct and final cause of vesical

cancer is as obscure as that of cancer elsewhere. Vesical papilloma often undergoes carcinomatous degeneration, and should therefore be early removed, both for that reason and because what is apparently a vesical papilloma may sometimes be a papillary carcinoma. From another point of view also vesical papilloma requires to be removed. It frequently gives rise to severe haemorrhage causing cachexia, to cystitis, vesical calculi, and retention of urine. All who have undergone an operation for vesical tumour should be examined every three months with the cystoscope, because of the danger of recurrence.

PARASITES

Several kinds of animal organisms may become parasitic in the bladder. The most important is Bilharzia haematobia, whose ova may be very numerous in the vesical veins. The parasite may cause haematuria, suppurative cystitis and the formation of papillary excrescences which may become malignant, or if they become incrusted and break off may cause the formation of calculi. Prophylaxis against infection with this parasite as well as against filaria sanguinis hominis, which sometimes causes haemochyluria, consists in avoiding the use of unboiled water and of uncooked vegetables and fruits in infected districts.

IV. Prophylaxis in Diseases of the Ureter

The diseases of the ureter are the diseases of the renal pelvis and bladder, indeed they mostly proceed from these. Prophylactic measures against the one are also prophylactic against the other, and there is no necessity therefore to speak specially about them.

V. Prophylaxis in Diseases of the Kidneys

CONGENITAL MALFORMATIONS AND MALPOSITIONS

Congenital malformations, among which absence of one kidney and horse-shoe kidney are of chief interest, cannot be prevented by any prophylactic measures. But their signi-

ficance from the point of view of prophylaxis is very great, because when nephrectomy is undertaken for any reason, such as cancer or tuberculosis, we must first ascertain that a second kidney exists which can carry on the functions of that which is to be removed. This does not however exclude all possibility of error. Congenital malpositions are interesting for the same reason, because they may mislead us in such cases. Of much greater importance is the prophylaxis of acquired malposition, the movable kidney. Slight degrees of this are not at all rare in women. Its aetiology is still a subject of controversy. The kidneys are normally held in position by the peri-renal fat, certain ligaments, the neighbouring organs, the peritoneum, and above all, by the intra-abdominal pressure (Senator). Diminution of the normal, intra-abdominal pressure makes it possible for the kidneys to sink down lower. Descent of the kidneys is therefore met with more especially in women whose abdominal wall has been rendered lax and pendulous by multiple or frequent child-birth, or hydramnios. Working-women especially suffer much from moveable kidney, and this is not due to chance nor probably to the greater opportunity we have of examining them. In working-women the great number of children is proverbial, and a woman who has but just been delivered becomes pregnant again very shortly afterwards. In addition there is the carrying of heavy weights and the pressure of skirts not supported by corsets or suspenders, and this is worse for the liver than the pressure of corsets. A diet which is generally insufficient causes the fat in the mesentery and abdominal walls to disappear, and thus diminishes the intra-abdominal pressure. It is especially the sudden disappearance of the peri-renal fat which is regarded, and correctly so, as the essential cause. That sometimes we find an extensive development of fat around a floating kidney does not disprove this; for the disappearance of this fatty capsule is not the only cause, and the number of cases of rapidly developing wasting is incomparably larger than the number of cases of floating kidney (Senator). Moreover, the diminution of the fat may be very

unequal in its distribution, and the kidney still be surrounded with much fat though all has disappeared from the rest of the abdominal cavity (Henderson, Oppolzer, Prior). The greater frequency of floating kidney in women is also explained by the fact that the liver and consequently the right kidney are forced down by the misuse of corsets. Tight lacing, chlorosis and enteroptosis stand in very close relation with one another, although the question as to which is the primary cause is in each case answered differently by different physicians. The kidneys generally also descend when the other abdominal organs descend. The displacements of the female genitalia are probably as a rule only the result of general enteroptosis, in other cases —certainly in parametritis and perimetritis—they may be the cause of floating kidney by dragging upon the ureter. Further, the pressure of adjacent tumours or the weight of the kidney itself (tumours or calculi) may be the cause of its displacement; trauma is probably the rarest cause. After what has been said about the aetiology, it is self-evident what the prophylaxis must be. We would specially caution against treatment for reducing stoutness, because irrationally followed it causes the peri-renal fat to disappear; especially does this apply to stout chlorotic patients, for whom the best anti-fat treatment is iron; because here there is the danger of chlorosis in addition to that of the acute disappearance of fat. If the floating kidney is not treated, the ureter may become twisted and symptoms of "strangulation" appear. An operation should therefore be undertaken. (nephrorrhaphy) or the kidney should be kept up by a belt. But the belt must be such as to fulfil its purpose, which most do not. Those who wear a belt must avoid all incautious movements, severe bodily work and much shaking; the digestion must be attended to, and more nourishing food taken when there is necessity for it.

CONGESTION OF THE KIDNEY, THROMBOSIS OF THE RENAL VEINS, EMBOLISM OF THE RENAL ARTERY

The prophylaxis of these diseases has been described under the prophylaxis of circulatory disturbances.

DIFFUSE, NON-SUPPURATIVE INFLAMMATION OF THE KIDNEY

All that injures the kidneys is brought to it by the circulation. First come poisons taken into the blood, which produce desquamation of the renal epithelium and inflammation of the interstitial tissues. The sources of these poisons are various. As regards prophylaxis, those are of special interest to us which in small doses are drugs but in larger doses taken continuously for a long time are injurious. The poisons which act upon the blood and thus produce nephritis have already been mentioned in the general section when speaking of the prophylaxis of haemoglobinuria. In children we should if possible avoid the use of naphthol (for scabies the allied preparation eucarin may be used instead), naphthalin, eudermol, picric acid, chrysarobin and pyrogallol. In adults too, the application over too large areas of chrysarobin, pyrogallol, tar, and cantharides, and the irrational use of glycerine, carbolic acid, turpentine, chloroform, sulphuric acid, oxalic acid, mercury and a few other substances may irritate the kidneys. In chronic forms of nephritis mercury and lead have specially to be considered. A physician may therefore be in perplexity when he wishes to prescribe mercury to a syphilitic patient who has nephritis. That nephritis can result from treatment by inunction we regard as quite untenable. On the contrary we may by thorough inunction cure a nephritis which is caused by syphilis. The syphilis injures the kidneys more than does the small quantity of mercury. Naturally, we must avoid excess of the drug. Some of these cases of poisoning may have arisen through their work. They will become rarer as modern hygiene spreads among workmen. But other substances taken in excess with food may also injure the kidneys, causing especially forms of chronic nephritis; these substances are strong spices, mustard, and especially alcohol in the more concentrated forms. Gouty and diabetic kidneys must also be regarded as of toxic origin. Other poisons may be of bacterial origin: in diphtheria,

scarlet fever, acute articular rheumatism, croupous pneumonia, typhus, septicaemia, measles, erysipelas, syphilis, and cholera; even in varicella and epidemic parotitis nephritis may appear. Prophylaxis in these cases is the avoidance of the infective disease, and its suitable and adequate treatment. Where specific treatment is possible, as in diphtheria and syphilis, it should be used. In acute infectious cases especially the patients should be confined to bed till the symptoms have disappeared. The urine should be examined several times during convalescence to see that it is normal. Many a case of chronic nephritis might be prevented if this periodical examination were made. It is well, whether or not there is acute kidney disease, to flush the kidneys thoroughly, as with aerated waters, fruit extracts, and milk, and to excite the activity of the skin. The simplest way of promoting perspiration is by rest in bed; but careful washing does no harm even in the most acute infectious cases. Tuberculosis too undoubtedly produces nephritis, but only the large white kidney. Intermittent fever, chronic suppuration and eczema may also play a part in the causation of nephritis, especially of chronic nephritis. The prophylaxis or treatment of these diseases will also at the same time be prophylaxis for the nephritis. The intestine probably also plays a part in the causation of nephritis. Although we find very few statements in books about this, yet in connection more especially with chronic nephritis, more attention than hitherto should be given to chemical decompositions in the intestine, in which bacteria are largely concerned. It is probably true that, as has been proved to be the case in hepatic cirrhosis, the kidney disease produced by alcoholic excess is the result of abnormal fermentative processes and decomposition engendered by the chronic gastro-intestinal catarrh. Nephritis in pregnancy is probably also of toxic causation because the kidneys of the pregnant woman have to eliminate the metabolic waste products of the two bodies. In such a case, prophylaxis requires that the woman should not soon again become pregnant; when she becomes pregnant again the urine

should be carefully watched; under some circumstances pregnancy should be altogether forbidden.

Other causes of nephritis are very unimportant compared with the large group of poisons. An important influence has been attributed to "taking cold," but whether rightly so, is questionable. One severe "taking cold" is said to produce acute nephritis; repeated getting wet and taking cold are said to give rise to chronic parenchymatous nephritis. This often results from a man's work and can therefore hardly be prevented. From the medical and sanitary side, damp places should not be inhabited. Secondary contracted kidney is met with also after cardiac disease; primary contracted kidney in pyelitis, lithiasis and atheroma. But for most chronic nephritis cases, prophylaxis consists in preventing and in treating acute nephritis.

About prevention of the acute disease we have just spoken. Acute infective diseases need to be watched in this respect. Acute nephritis which sets in suddenly with well-marked symptoms is as a rule diagnosed and treated till the symptoms have disappeared. The danger is in the forms which set in insidiously and probably later are regarded as "physiological," "cyclic," or "periodical" albuminuria. Therefore we should never omit, in convalescence after acute and infective disease to examine the urine from time to time, and this should be done also occasionally with healthy people. The treatment of acute nephritis is purely dietetic: absolute rest in bed, perfectly bland non-stimulating diet, avoiding extractives; above all, milk should be given though not to the exclusion of everything else; slight diuresis should be promoted by vegetable salts and carbonates of the alkalies and by promoting the action of the skin as recommended in the general part for the prophylaxis of oedema. When nephritis is present we should adopt prophylactic measures against dropsy and uraemia. In chronic cases, especially of contracted kidney, attention should also be paid to the heart. The physician has in his prophylactic measures to steer his way between the dangers of cardiac insufficiency and of exciting too greatly the cardiac action in a vascular system which is somewhat brittle. These hy-

gienic and dietetic measures are no less important in the chronic forms of nephritis than in the acute. Further details about the therapeutic treatment of nephritis cannot be given here.

PYELITIS, PYELONEPHRITIS, SUPPURATIVE NEPHRITIS

As a rule the renal pelvis is first affected and thence the affection extends to the renal substance. The converse order of events is also met with but is much less important and frequent. In suppuration of the kidney and consequent pyelitis, the prophylaxis of the renal affection will be important; it may be the expression of a general septic condition or of some disease of the surrounding connective tissue, or of some infection which has entered through a penetrating wound. It is obvious that a penetrating wound of the kidney must be treated according to antiseptic rules. Suppuration around the kidney must be prevented by treating the primary affection, which may be perityphilitis, perimetritis, or spinal caries. When these processes threaten to affect the renal pelvis the same prophylactic measures are required. In a number of infective diseases, microbes or their bye-products are eliminated by the kidneys, and thus the pelvis and often also the renal substance become diseased. Thus we see pyelitis after smallpox, dysentery, typhus, and especially after cholera. The best preventive of such pyelitis is prevention of the infection itself, and a careful watch over the condition of the urine, especially during convalescence. Special caution is needed in the use of some drugs, for example turpentine, copaiba balsam, cubebs, oil of mustard, balsam of Peru, cantharides, tar, and diuretics which may irritate the kidney and the renal pelvis. At least we should, when using these substances, examine the urine from time to time. That pyelitis may be caused also by taking cold seems doubtful, but it is given on the authority of Senator. In women the predisposition to pyelitis from cold is said to be increased by menstruation. The prophylaxis in these cases is self-evident, as also in inflammation of the renal pelvis produced by congestion, as in cardiac and pulmonary

disease, pregnancy and floating kidney. Calculi in the renal pelvis are a very common cause of pyelitis and pyelonephritis; according to their size, form and consistence they give rise to various degrees of inflammation of the renal pelvis and adjacent renal substance. For their prophylaxis, see the chapter on calculi; and for the rarer affections caused by animal parasites, see "parasites of the bladder." In every case foreign bodies should if possible be removed. The most important form of these diseases of the kidney and pelvis is the ascending. Beginning in the lower urinary passages, the infectious process ascends along the ureters to the renal pelvis. All microbic, particularly the suppurating, processes of the urethra, prostate and bladder may extend to the renal pelvis and the kidney. In the general part we pointed out the importance of using aseptic instruments, and also how important is the early treatment of gonorrhoea, stricture, cystitis and all urinary obstructions. The urinary obstruction met with in strictures, prostatic enlargement, and paralysis of the bladder greatly favours the possibility of infection, not only because catheterization is more dangerous than in the absence of such obstruction, but also because intestinal bacteria can reach the urinary passages more easily from the blood-stream, as the experiments of Posner have proved. Treatment of these diseases will at the same time prevent their sequelae. Acute pyelitis must be cured in order that it may not become chronic or attack the renal tissue; when suppuration has already occurred in the kidney, the suppurating focus should be removed to prevent septicaemia. We must again emphasize the necessity of the greatest care when there is so-called "surgical kidney," in letting all operations on the bladder or urethra be non-irritating and aseptic or in avoiding such operations altogether. A mistake may rapidly cause death from "urinary fever." In the severe forms of purulent nephritis there are the same dangers of uraemia and dropsy as in non-purulent nephritis, and they need the same prophylactic measures. In chronic pyelitis every acute exacerbation of the disease should be avoided. The patients must be guarded

against taking cold and this is best done by rest in bed; the food should be non-stimulating, but by this is not meant a milk diet; the patient should avoid alcohol and strong coffee, and the renal pelvis and kidney should be well flushed by the use of milk, skimmed milk, linseed tea, alkaline waters, and lemonade. Stronger diuretics are contra-indicated. Those mentioned remove the acidity of the urine, loosen the mucous secretion of the renal pelvis and are especially useful when the pyelitis has been caused by the uric acid diathesis. Only when decomposition with ammoniacal urine has developed is it permissible to use antiseptics, which in part render the urine acid, such as salol, methylene blue, but not urotropin. The rest is purely a question of treatment. For inoperable cases of pyelonephritis, L. Weber recommends creosote in doses of three to five minims three times daily, as a prophylactic against the danger of septicaemia.

TUBERCULOSIS OF THE KIDNEY

See the chapter on "Urogenital Tuberculosis."

AMYLOID DISEASE OF THE KIDNEY

As we can hardly speak of a cure for amyloid disease, and as treatment, apart from maintaining the bodily strength, can only endeavour to avoid the primary cause or to treat it, a wider field opens for prophylaxis. The cause of amyloid disease is a degeneration of proteid, occurring in several forms of cachexia. The wasting produced by malignant new growths causes the amyloid disease to fall into the background when compared in significance with the primary disease. The early and complete removal of the diseased part whenever possible, is the only prophylactic treatment. The chief causes of amyloid disease are tuberculosis, prolonged suppuration, chronic bullous skin affections, empyema, suppuration in the urinary passages, tuberculous and other diseases of the joints and bones, and syphilis; rarer causes are malaria, gout and rickets. Even when amyloid disease is present, we should treat the

primary cause to prevent further progress of the disease. If malaria be excluded, practically syphilis alone remains, and this may generally be checked by therapeutic measures. The iodides are as a rule the best antisyphilitic drug, because these are generally cases of late syphilis and because mercury tends to increase the existing cachexia.

CYSTIC KIDNEY, HYDRONEPHROSIS AND PYONEPHROSIS

Prophylaxis is powerless against congenital cystic kidney, which is the result of some error of development. But greater importance attaches to prophylaxis in acquired cystic kidney. Every condition which opposes gradually increasing or temporary difficulty to the flow of urine will cause the parts above the site of the obstruction to become distended. It is only a question of the site of the obstruction whether the cystic condition is unilateral or bilateral, and whether in addition to affection of the kidney there is also affection of the ureter, bladder and posterior part of the urethra. Prophylactic measures must therefore be directed at the prevention of an obstruction, or at its removal if possible should it already exist. We should try to prevent or cure the chief cause of stricture, namely gonorrhoea; prostatic hypertrophy should be treated as described elsewhere. In paralysis of the bladder, regular catheterization aseptically carried out is needed. Other prophylactic measures are identical with the measures required for floating kidney, the formation of calculi in the urinary passages, pregnancy and uterine displacements. Malignant growths of the uterus and other pelvic organs, which may cause hydronephrosis, are more important as regards prophylaxis, but also unfortunately more inaccessible than the hydronephrosis caused by them. When there is hydronephrosis, great care should be taken that no pathogenic germs are conveyed to the urethra by instruments, so that the sac may not begin to suppurate. For the same reason (apart from mechanical reasons) the bowels should be made to act regularly. By carefully avoiding everything which could irritate or injure the kidneys, that is by a diet similar to that for contracted kidney, we

may avoid the danger of disease of the renal substance, or in a unilateral but severe hydronephrosis may prevent the sound kidney from becoming affected.

NEW GROWTHS OF THE KIDNEY

The aetiology of new growths of the kidney—and practically we have only to consider the malignant growths—is almost as obscure as that of all other malignant new growths, so that it is scarcely possible to speak of prophylaxis. How far trauma is concerned in the production of carcinoma, is not yet decided. It would better perhaps explain the causation of renal sarcoma. On the other hand, some renal tumours appear to be derived from strayed portions of supra-renal tissue. Since it has been established by Grawitz that Cohnheim's theory as to tumours holds good at least for some forms of renal tumour, it would seem best as regards prophylaxis to avoid everything which might render possible the setting free of imprisoned groups of cells. Trauma if severe enough to cause laceration of the renal substance would surely first do so at the lines of demarcation between normal and heterologous tissues. Trauma acting for long periods of time favours carcinoma ; thus we find as a matter of fact, carcinoma following upon renal calculi. Prophylaxis consists in removing calculi from the urinary passages. Let us once again emphasize that in all cases where removal of the kidney appears necessary, the operator should first convince himself of the existence of a second sound kidney.

ANIMAL PARASITES OF THE KIDNEY AND RENAL PELVIS

Prophylaxis is the same as for those parasites in the bladder. A few other parasites, such as echinococcus, cysticercus cellulosae and strongylus gigas are so rare, that it is scarcely necessary to mention them here. The most common is the echinococcus. As a prophylactic, it is best not to keep dogs, or to be specially careful in coming into contact with this animal or in touching the mouth or food with hands which are not quite clean.

PERINEPHRITIS

Inflammation of the fat surrounding the kidney, and suppuration in it are the result of causes similar to those which lead to abscesses of the kidney and renal pelvis, and it also may proceed from similar processes in the kidney itself. Further, we may say that it may be due to trauma, perhaps also taking cold, strains in the lumbar region through excessive work, infective diseases such as scarlet fever or small pox, perityphlitis, perimetritis, subphrenic abscess; also empyema, bronchiectasis, pulmonary abscess and caries of the vertebrae and ribs may all produce perinephritis. From what has been said, it is obvious what are the prophylactic measures.

Appendix to Diseases of the Urinary Passages

1. URINARY CALCULI

Prophylactic measures for stone are directed on the one hand against the development of calculi, and on the other against the secondary affections produced by their presence in the urinary passages. Little can be done against the hereditary predisposition which is often present. If the patient lives in a district where stone is common, it may be advisable for him to remove to another locality. We may also forbid the drinking of water in such districts, although the influence of water on the formation of calculi has not been definitely established and it is difficult to carry out such an order. In connection with uric acid calculi the infarcts in new-born children are of some interest. These infarcts physiologically produced in the uriniferous tubules may not in weaker children be washed away by the urine, as is the rule, but remain at some spot in the urinary passages and give rise to calculi. In such cases it is best therefore in the first few days when the mother's milk is still small in quantity, to give the child plenty of diluted cow's milk to produce greater diuresis. The increased production of uric acid is to-day generally regarded as the consequence of increased destruction of nuclein, especially

from the destruction of leucocytes. But it has not been proved that in the formation of uric acid calculi, uric acid is produced in excessive quantity. Not even in gout, which bears a close relation to urolithiasis, is this always the case. We see that digestive disturbances often accompany the formation of calculi, that renal colic may follow intestinal disturbances, that scrofula and lead poisoning which commence with disturbances of digestion and assimilation, are associated with urolithiasis, that on the other hand digestion much increases leucocytosis, and hence one has to link together these associated conditions. Nevertheless there is still too little definite evidence to permit us to conclude that the formation of uric acid calculi is to be explained by increased production and elimination. For the present we must accept the main conditions for the formation of calculi to be: (1) An abnormal concentration and reaction of the urine. In very acid urine the very soluble sodium biurate becomes the less soluble sodium urate or even uric acid. (2) Probably the absence of substances in the urine which dissolve the materials out of which stones are formed or the presence of substances which throw down the materials that form stones. (3) The existence of a substance which forms the organic framework of all calculi. This probably consists of products of the desquamation of the epithelium, especially of the kidneys and renal pelvis. The process seems to be as follows: first, for one of the reasons given above, uric acid is thrown down, this especially in the acuminate form irritates and causes desquamation of the epithelium; next the stone is formed, and in its turn like every foreign body increases in size by the accretion of fresh urates. When the reaction of the urine is neutral, and still more when it is ammoniacal, as is often the case in bacterial decomposition of the urine, then the phosphates are thrown down and form a layer around the original uric acid calculus. Naturally, this occurs most often in the bladder, where the original stone combined with septic catheterization has produced ammoniacal inflammation. It is evident that phosphatic calculi may be formed from alkaline urine without any previous formation of uric acid gravel. On the

other hand, we are wholly in the dark concerning the conditions required for the development of calculi composed of calcium oxalate, cystine, indican, and carbonates. Preventive measures should therefore be directed especially against uric acid and phosphatic calculi. As to these — patients with a tendency to gravel and stone should be treated much in the same way as gouty patients. One has to try and prevent an excessive formation of uric acid. We need not forbid animal food so as to reduce considerably the ingestion of nitrogenous substances, but we should so far as possible forbid all substances which contain much nuclein, such as liver, brain, spleen, sweetbread, caviare, or yolk of egg. Also we should forbid very large quantities of substances which are not very beneficial such as carbohydrates and fat, and should prescribe a mixed diet containing albumen, fat and carbohydrates in moderate quantities. All the stronger forms of alcohol should be forbidden, and plenty of milk be taken. Everything likely to irritate the kidneys should be avoided, such as strong spices, smoked and pickled food, beer and cider, and all the substances above enumerated as those to be avoided in kidney disease, and this holds good too for phosphatic and other stones. Metabolism must be encouraged by plenty of exercise in the open air, gymnastics and baths (which also act as diuretics). Diuresis should be promoted, and this can best be done by alkalies (potassium carbonate, sodium carbonate, lithium citrate, carbonate or iodide, uricedin, limewater and magnesium borocitrate; the latter is particularly useful when at the same time there is catarrh of the urinary passages. Senator gives the following: Magnes. borocitrat. 50 parts; sacch. alb. 100 parts; ol. limonis, 1 part; a teaspoonful in soda water, three times a day. For the alkalies, we can substitute waters containing alkaline chlorides, or if there is catarrh earthy saline mineral waters. The same effect is produced by artificial mineral salts and certain artificial mineral waters. Besides promoting diuresis, alkalies also reduce the acidity of the urine. But we must not carry this to extremes, and when the reaction begins to be alkaline or neutral the patient should at once discontinue

taking them, otherwise there is the danger of the formation of a phosphatic shell around the uric acid calculus. When there is ammoniacal pyelitis or cystitis or a phosphatic stone, waters containing free carbonic acid and chalybeate waters should be used instead of those containing chlorides of the alkalies or the alkali-earths. Moreover we may try to dissolve the calculi which have already formed by substances which render them soluble. Those recommended for uric acid are piperazin hydrochlorate (7 to 15 grains several times a day), piperidin, lysidin (15 grains several times a day in soda water), lycetol (15 grains in soda water two or three times a day), urotropin (7 to 15 grains several times a day in water), and other substances, but we must not expect very great results. Phosphatic calculi cannot be certainly influenced by the solvents suggested for them (mineral acids). When oxalate calculi tend to form, food containing much oxalic acid should be avoided; these are sorrel, endive, Brussels sprouts, purslane, beans, spinach, tea, and fermented beverages. Yet it has not been proved that these substances can produce oxaluria. Other rules, including those relating to the administration of alkalies, are the same as those given for uric acid calculi. The same treatment is also suitable for the rare calculi composed of xanthin. When there is a tendency to the formation of cystine calculi, which is said to be connected with abnormal decomposition in the intestines, care must be taken to secure a regular action of the bowels. Carlsbad waters, which are also diuretic, are best for this purpose; in addition, we may now and then give intestinal disinfectants (salol, resorcin, or calomel). The general rules for diet and exercise are *mutatis mutandis*, the same in all kinds of calculi. By such means we can in many cases prevent renal colic.

The prophylaxis of stones which form in the bladder requires the removal of all foreign bodies which may have got into the bladder—pieces of catheter, hair-pins, animal parasites, sequestra, projectiles, points of pencils, wax tapers, renal calculi, and ligatures. Ligatures may wander into the bladder from the female genital organs, when left by oversight during an operation. Retention

of urine should, whenever possible, be removed or at least rendered harmless by aseptic catheterization, and vesical catarrh should be treated.

Stones may cause several secondary effects, namely: haemorrhage, pyelitis, pyelonephrosis, renal abscess, perinephritis, urethral, renal and vesical fistulae, cystitis, prostatis, extravasation of urine, urinary abscess, retention of urine, uraemia and hydronephrosis. A stone in the bladder should always be removed surgically, and a stone in the renal pelvis when it produces serious effects. In operative procedures within the bladder we must consider any kidney disease that is present, ammoniacal cystitis, and softness of the bladder wall. It is under these circumstances sometimes necessary, especially in old age, to avoid all interference, or to postpone it till the nephritis or cystitis is better; it is also well first to accustom the bladder to the lithotrite by careful catheterization.

2. DIABETES MELLITUS

Since we do not know the essential cause of diabetes, we can only try to prevent the disease by avoiding those things which experience shows us not rarely lead to diabetes. Among these are gout, obesity, brain lesions from trauma and apoplexy, syphilis, and the excessive ingestion of sugar and of substances which contain sugar. Diabetes shows a great tendency to be hereditary, and it is therefore well not to give to the children of diabetics too much carbohydrate food, and to examine their urine for sugar at regular intervals after the ingestion of amylaceous food; in order that we can treat the disease from its very commencement, and endeavour to prevent the development of other anomalies of metabolism.

Periodical examination of the urine is advisable for every one. When diabetes is present, the chief aim of prophylaxis must be to maintain the nutrition and to prevent coma. Most important is dieting according to strict principles. We could not enter into this more freely here, unless we were to describe the treatment. The chief thing is the restriction of the carbohydrates. But the individual case

must be considered and the mild cases distinguished from the severe. In the latter we must beware of excluding carbohydrates altogether from the diet, and in the moderately severe forms we must continue the albuminous and fatty diet only so long as it gives rise to no trouble which presages coma. In the mild forms, on the other hand, after we have succeeded by strict dieting in eliminating the sugar from the blood, carbohydrates should be again introduced in moderate quantities and gradually increased. No diabetic should ever take large quantities of starch or sugar. The diabetic diet is aided by regular moderate muscular exercise and by proper care of the skin (baths).

There is a tendency to attacks of perspiration and to taking cold afterwards, and it is best therefore for the patient always to wear warm clothes (wool) and in cold weather to go to a warmer climate. Mental excitement must also be forbidden, and exciting work should be given up at least for a time. There is in diabetics a tendency to tuberculous disease, especially of the lungs, which is apt to take a serious course, and also to suppurative and gangrenous diseases; such diseases, and operation wounds should be carefully treated from the very beginning. The diabetic urine should be examined from time to time to see whether the quantity of sugar has increased and whether ammonium carbonate, oxybutyric acid, casts and acetone are present in large quantities. If this is the case, the danger of coma setting in must be prevented by promoting diuresis with alkaline waters, the administration of alkalies in large quantities (8 to 10 drams of sodium bicarbonate a day), with a strictly nitrogenous diet. Owing to the danger of coma and of the serious course which wounds run, surgical operations on diabetic patients should only be made after the sugar has been removed as much as possible from the urine.

VI. Prophylaxis in Diseases of the Prostate

ACUTE INFLAMMATION OF THE PROSTATE

The chief cause of acute inflammation of the prostate is gonorrhoea which extends from the urethra to the prostate. The prevention or proper treatment of gonorrhoea and its

sequelae is therefore also the prophylaxis of gonorrhoeal prostatitis, and we refer the reader to what has already been stated about this. But we would draw attention to the fact that forcible injections are apt to produce prostatitis, and further that at the time (third week) when the gonorrhoeal patient feels better and is more likely to do foolish things, he should be cautioned to be careful, especially about exercise and sexual excitement. The inflammatory process may extend also to the prostate from disease of the rectum (proctitis, fistula, haemorrhoids), of the vesicular seminales and other neighbouring organs; but such cases are rare. The method of prophylaxis must be according to the primary cause. Several other conditions are said to be able to produce inflammation of a prostate which is no longer healthy, or is congested or in an irritable condition. Among these are excessive riding, especially on a bad saddle, injury by instruments introduced into the urethra, urethral calculi, the careless application of caustics to the posterior urethra, the retention of a catheter too long, alcoholic excesses, the use of substances which irritate the urinary passages, coitus, masturbation, forced marches, constipation, haemorrhoids and other circulatory disturbances in the rectum. The chief danger in acute prostatitis consists in suppuration of the prostate, accumulation of pus around the prostate, and rupture into the neighbouring organs and pyaemia. Every means must be used to prevent the development of such serious consequences. We should reduce the inflammation by applications of cold in the rectum and to the perineum or should disperse it by prolonged warm baths and moist compresses. Mercurial ointment may be smeared on the perineum and inner surface of the thigh, local bleeding may be resorted to, and a solution of ichthyol (five to ten per cent.) may be injected into the rectum twice a day. If nevertheless suppuration occur, we should not hesitate to make an incision through the perineum at the very first sign of suppuration, as soon as a soft point can be felt through the rectum, in order to prevent the pus from perforating the capsule. To wait for definite fluctuation would be to lose the most suitable moment. The complete cure of an acute

prostatitis is prophylaxis of the highest order, not only because it prevents the development of chronic prostatitis and sexual neurasthenia, but also because in tuberculous individuals or those predisposed to tubercle, prostatitis prepares a *locus minoris resistentiae* for the development of prostatic tuberculosis.

CHRONIC INFLAMMATION OF THE PROSTATE

Guyon states that gonorrhoea is probably the only cause of chronic prostatitis. We cannot accept this statement. Chronic prostatitis may also arise from vesical catarrh, masturbation, perhaps also from haemorrhoids, trauma (riding) or cold. Nevertheless the treatment of gonorrhoea and the prevention and treatment of urethral stricture is the best prophylactic against most chronic inflammations of the prostate. Many of these are the direct result of acute prostatitis, others set in insidiously and are not noticed during the course of the acute gonorrhoea. Hence the necessity for proper after-treatment of acute prostatitis and examination of the prostate during or after posterior urethritis; yet it must be mentioned that a gonorrhoea which has only affected the anterior urethra may also cause prostatitis.

Although chronic prostatitis may often give rise to no symptoms, yet its treatment is a necessity in a prophylactic sense because experience shows that it is often followed by sexual neurasthenia. We should therefore continue the treatment till with the finger in the rectum, we can press out only normal secretion mixed at most with a few leucocytes. For chronic prostatitis too we can recommend ichthyol injections which, together with massage of the prostate, and hydropathic measures have a very good effect.

TUBERCULOSIS OF THE PROSTATE

See the chapter on "Urogenital Tuberculosis."

HYPERTROPHY OF THE PROSTATE

Prophylaxis in the sense of prevention of the enlargement of the organ is impossible, because the aetiology of the enlargement is still obscure. Those who consider the cause

to be inflammatory conditions of the urethra and prostate we refer to what has been said in the chapters on gonorrhoea, stricture and prostatitis. Those who regard hypertrophy of the prostate as the consequences of arterio-sclerotic processes with secondary, congestion, will adopt measures against the arterio-sclerosis; in commencing arterio-sclerosis, the internal use of potassium iodide is especially to be recommended. Those who consider congestive conditions of the bladder, prostate and surrounding parts to be the chief cause, will employ those measures which will prevent the development of the congestion.

However greatly authorities differ in their opinion as to the cause of prostatic hypertrophy, all are agreed that congestive conditions in those who have prostatitis are harmful, and that in this respect there is a wide field for prophylaxis. As prostatic hypertrophy is a very common disease of old age, and according to Guyon occurs in thirty-four per cent. of all men over sixty years of age, but leads to symptoms of disease only in fifteen to sixteen per cent., if we exclude slightly increased frequency of micturition, it follows that for prophylaxis, old people should be given certain precautionary rules which will help them to avoid congestive conditions in the pelvic organs and serious changes in the bladder. Cold in any form, but especially coldness of the feet, is dangerous. Old people do well to wear woollen underclothing; the bedroom should not be quite cold, so that they may not take cold when they get up at night to micturate. Moreover, old men should be told never to postpone micturition because of *social duties*, or on account of being in bed. Micturition in bed is not permissible, because the bladder is not thereby perfectly emptied and retention may arise in time. Sluggishness of the intestines in severer cases and indeed in all cases is a cause of congestion and should be removed. For this purpose, sulphur preparations are best, and if hypertrophy already exists, cool injections (Guyon). Regular bodily activity, though not excessive, is also good. Very special importance is to be attached to food and drink. A special régime need only be prescribed for those in whom the disease

already exists; nevertheless we may even before this occurs give old gentlemen certain rules, which should be observed for other reasons too.

Alcoholic excess and feasting are not permissible. Experience tells us that after one such excess, retention may set in as a symptom of prostatic hypertrophy which had before not been known to exist. Therefore old men must observe caution at suppers, dinners, convivial gatherings, and such like, which sometimes are followed by venereal excess. New beer, effervescent wines, and highly spiced, salted and pickled food should be avoided. Old gentlemen should eat only one large meal a day and this should not be in the late afternoon; the evening meal should be frugal and easily digestible to prevent abdominal congestion. As soon as the first stage of prostatic hypertrophy, namely functional disturbance without retention, has been diagnosed by the physician, the rules of hygiene for old men, as given above, should be strictly followed. All foods which cause congestion must be avoided; among such are: beer, white wine, strong coffee, crabs, sea fish and asparagus. The same is true also of irritating drugs. For the rest, the rules above given should be followed. It is the quantity of food rather than the manner of taking it which needs to be restricted. Much drinking is always injurious, and Guyon advises those who have prostatic disease, or any vesical affection, not to follow treatment at spas. For the same reason (to avoid pelvic congestion), patients should not be much in armchairs during the day, but should take moderate exercise, and should not prolong the night's rest beyond what is needed by their age and condition. Guyon recommends walking for fifteen to twenty minutes before going to bed, and walking about a little in the morning before the first micturition. The activity of the skin should be promoted by massage, friction and baths, because this relieves the pelvic organs; but baths which exceed a quarter of an hour have the contrary effect. See also the general rules given above for old people. Sexual intercourse should when possible be entirely forbidden.

Special care is needed in catheterization. It is obvious that

this must be done aseptically, and that if self-catheterization is permitted, it should be according to the rules stated in the general part, if one wishes to avoid serious consequences, such as cystitis and phosphatic calculi. In the first stage of the disease, catheterization should, if possible, be altogether omitted; an unnecessary catheterization, whether for diagnostic or therapeutic purposes, may at once increase the mischief and cause retention. On the other hand as soon as retention has set in, catheterization is absolutely essential. Not only may the retention be relieved by regular catheterization, but frequently we can by catheterization restore the condition of incomplete retention. We shall also do good prophylactically by catheterization, because it prevents the congestive symptoms associated with retention of urine, and therefore cystitis and increase of the prostatic hypertrophy and of the retention are rendered less likely. Guyon recommends catheterization even for people in whom there is as yet no retention of urine, but only difficulty in micturition. He advises also that catheterization should be continued only when it relieves frequent micturition; in all other cases it is contra-indicated. The catheter must be passed as often as the patient has need of it. In cases where catheterization produces pain or haemorrhage, a self-retaining catheter is indicated. Acute retention must be removed, but one should first try warm baths and opiates before having recourse to the catheter. But if the bladder is already distended, the urine must be removed under any circumstances by the catheter or by puncture with a trocar. In retention of urine, catheterization must be employed until the retention is completely cured, and must not be discontinued as soon as the patient begins to micturate; for there would then be an incomplete retention, the evil effects of which would be increased by the congestion which results from the efforts made to force out the urine. When complete retention has produced permanent distension and consequently overflow of urine, catheterization is needed for therapeutic reasons; but the catheter should be used with great caution. We must especially caution against a rapid reduction of intravesical pressure, to which

reference has already been made in the chapter on "stricture," against infection which in this stage may make very rapid advance, and against careless catheterization in those who have surgical kidney or are very marasmic. In these cases the tolerance of the urethra should first be increased by the careful introduction of instruments. If nephritis is also present, the case should be treated according to the prophylactic measures given in the chapter on inflammation of the kidney. We cannot go further into the question of prostatic hypertrophy and its complications, as this belongs to therapeutics.

VII. Prophylaxis in Disease of the Vesiculae Seminales

Prophylaxis has only to do with inflammation of the vesiculae seminales, especially gonorrhoeal, and with tuberculosis. The diseases of the vesiculae seminales have been very little studied; they occur mostly combined with disease of neighbouring organs, and the prophylactic measures against them are the same as in disease of the prostate and epididymis, and reference should be made to those sections.

VIII. Prophylaxis in Disease of the Spermatic Cord, Testis, and Epididymis

The skin of the scrotum may be affected by the same diseases as the penis. The chief affections are parasitic, as for instance, erythrasma, which sooner or later becomes complicated with eczema, though the latter may also occur independently. Erythrasma can be prevented by cleanliness and baths, and the eczema also in so far as it is caused by urine (as in scrotal fistula) and perspiration; in addition, inert powders should be sprinkled over the part when there is a tendency to eczema, and ointments should be used when there is a fistula. Cellulitis of the scrotum is the result generally of extravasation of urine. Its prophylaxis consists in the prevention and treatment of the primary trouble (gonorrhoea, stricture, and false passages). It is met with also in very marasmic patients, in those who

have diabetes and nephritis, and atheroma. Here, in addition to prophylaxis of the primary disease, care must be taken to avoid small wounds. The prophylaxis of cellulitis, which results from infective diseases, such as typhoid, scarlet fever, mumps and smallpox, belongs to that of infective diseases. Scrotal fistulae may arise from urinary abscesses, but more often they are caused by suppurating buboes which have burrowed, and by inflammation and abscesses of the testis and epididymis, especially tuberculous in nature, more rarely gonorrhoeal. For their prophylaxis see section relating to those diseases. Special significance attaches to one kind of carcinoma, "chimney-sweep's cancer," which is apt to appear in chimney-sweeps, and workers with paraffin and tar, apparently as the result of irritation by these materials. The disease depends upon the occupation and prophylaxis depends partly therefore upon the choice of a vocation. Here too, daily baths and washing to remove the irritating material act as preventives. Elephantiasis scroti, which is rare in temperate zones, and may also affect the penis, is a disease whose cause is still very obscure. The lymphangiectatic form often found to be caused by the presence of filaria sanguinis hominis in the lymphatics, can be prevented by the measures given above against getting the parasite into the body.

HAEMATOMA

Haematomata may be caused by injury of the tunica vaginalis of the testis.

For purposes of prophylaxis we must bear in mind the possibility of wounding the inner layer of the tunica vaginalis through incautious puncture of a hydrocele and injury of the testis or of a vein. These haemorrhages generally need to be removed surgically, otherwise chronic haematocele with hydrocele, chronic hydrocele, and thickening of the tunica vaginalis may result.

ACUTE HYDROCELE

is sometimes met with after injury, after the injection of irritating substances into the sac of the tunica vaginalis in operating for chronic hydrocele, after over-exertion,

from cold, and the pressure of a truss; more frequently it is the result of urethritis, phlebitis, and cystitis; most frequently it occurs after orchitis, epididymitis, or inflammation of the vas deferens. We meet with it therefore in all infective diseases which cause inflammation of these organs, especially in gonorrhoea. Measures to prevent the primary trouble will also help to prevent this effusion into the tunica vaginalis. Nevertheless when there is great accumulation of fluid, the distress may be so great that it becomes necessary to remove the fluid by puncture. Strict asepsis must be observed in this operation so that suppuration may not arise, though sometimes pus is present from the very beginning. If suppuration occurs a free incision should at once be made, weak antiseptics used, and drainage, as there is danger of spreading cellulitis, peritonitis, or even in the most favourable cases, of the formation of fistulae.

CHRONIC HYDROCELE

Chronic inflammation of the tunica vaginalis of the testis may proceed from an acute attack, may be congenital, or may be the sequela of disease of the testis and epididymis. The prophylactic measures are self-evident from what has been said. When small the swelling causes little trouble, but when large an operation is decidedly indicated, because it is a source of trouble to the patient by the increased weight which it causes. When the penis is lost in a large tumour, micturition may be rendered difficult and impotence caused, to which the frequent co-existing deficient power of erection of the penis contributes. In consequence of the pressure upon the testis the production of semen suffers, hence sterility may exist; moreover, large hydroceles predispose to hernia.

HYDROCELE OF THE CORD

The aetiology is much the same as in the foregoing. One form communicates with the abdominal cavity; and even with that form which has apparently no communication with the peritoneal cavity, we must be cautious in inject-

ing fluids, because a very long, narrow communication often exists.

HAEMATOCELE

Haematocele arises either accidentally through injury or the puncture of a hydrocele, when a vessel or the testis itself is injured, or it may arise independently.

Great importance attaches to it, in a prophylactic sense, because it gives rise to suppuration in the tunica vaginalis much more readily than does the serous form, and it may cause atrophy of the testis; early aseptic excision of the tunica propria is therefore required.

VARICOCELE

This may be prevented to a certain extent, in so far as it is possible to reach the causes which favour it. The veins of the spermatic cord, like the veins of all other dependent parts of the body, become distended by rise of the hydrostatic pressure within them. We find it therefore very frequent when the abdominal pressure is increased by great efforts as in habitual constipation, and in chronic diseases of the abdominal and thoracic cavities, which increase the pressure or interfere with the action of the heart. It may also be due to the pressure of trusses, of the intestine in inguinal hernia, and may occur in consequence of prolonged standing at work, as in bakers. Everything which produces congestion of the genital organs, such as too frequent coitus, masturbation, and diseases of the testicle and epididymis may also cause it. Acute varicocele may be caused by trauma. A varicocele must never be left untreated. The patient can wear a suspensory bandage and thus prevent atrophy of the testicle, diminution of sexual power, some subjective sensations which appear specially after bodily exertion, phlebitis, and thrombosis with their dangers of pyaemia and gangrene. For this reason the old operation of ligature cannot today be recommended, but some of the varicose veins should be excised with strict aseptic precautions. If all the veins are removed gangrene may result.

MALFORMATIONS OF THE TESTIS

Prophylaxis is only possible for cryptorchism when the testical lies in the inguinal canal. In must be removed by extirpation if in no other way, because these retained testes are generally functionless. If they remain in the inguinal canal they may become inflamed, cause strangulation, or become cancerous.

NECROSIS OF THE TESTIS

may be spontaneous, as the result of embolism or thrombosis of the spermatic artery. The prophylaxis for these diseases is given in the section on the prophylaxis of internal diseases. More interest attaches, from our point of view, to those necroses which follow the division of the artery, or complete extirpation of the veins, as may sometimes happen after operations on the vas deferens and pampiniform plexus.

INFLAMMATION OF THE TESTIS AND EPIDIDYMIS

Inflammation of these structures arises either by way of the blood stream, or more commonly through the urethra and vas deferens. The latter course is that taken in the case of gonorrhoea because the gonorrhoeal process extends to the vas deferens. These is no absolutely certain prophylaxis against this; for there are people who are treated in bed from the very beginning of their gonorrhoea and anxiously carry out all precautionary measures, and yet get epididymitis. Nevertheless, in most patients the inflammation does not appear before the end of the second or beginning of the third week. This is the time when not only has the gonorrhoea very often reached the hinder part of the urethra, but also when the patient feels better subjectively and, contrary to medical orders, takes active exercise, drinks much, and last but not least, commits sexual errors. To prevent epididymitis the most careful hygienic and dietetic regulations are needed, and the surgeon should show the patient how to put on a suspensory bandage, made to fit well and provided with thigh straps. The surgeon should also give the first injection. For the rest, reference should

be made to the chapter on gonorrhoea. As gonorrhoea of the hinder part of the urethra is often unnoticed, and thus readily becomes chronic, exacerbations of the process may occur years after infection and lead to epididymitis and to recurrent attacks. These are the cases where the blame is laid on "trauma" and "over-exertion," when it is really due to the chronic gonorrhoea. We have to regard in the same light those inflammations of the testis and epididymis, which are the result of prostatitis and therapeutic manipulations in the posterior urethra, although catheterization, caustics, and the injection of concentrated substances into the posterior urethra are enough by themselves to produce these complications. The prophylactic measures are evident after what has been said. We must be very cautious in the catheterization of a urethra which is still in a condition of inflammation. These affections may also follow upon cystitis, the passage of gravel, and inflammation behind a stricture, the prophylaxis of which has been explained elsewhere. The testicle and epididymis may become affected through the blood stream in some infective diseases, such as mumps, smallpox, malaria, scarlet fever, typhus and pyaemia; as a rule, the testis becomes affected first, except in typhus. For the prophylaxis, see the sections on the prophylaxis of these diseases. In all cases of inflammation of the testis and epididymis, treatment is most important from the point of view of prophylaxis, and should consist first of rest in bed and sedative measures, which, when absorption begins, may be replaced by lukewarm baths and the application of ointments to promote absorption. In an inflammation which follows in the course of an infective disease, suppuration and atrophy should be prevented; in those caused by gonorrhoea, the seminal tubules often become obliterated whether there be atrophy or not, and there may, or may not, be obliteration of the vas deferens as well. If the process is bilateral, the result is sterility. Nevertheless, unilateral gonorrhoeal epididymitis may also very frequently produce absence of spermatozoa, either because there has been an undiagnosed inflammation of the vas of the other

side, or perhaps because the other testicle was functionless. We would therefore point out how necessary it is to treat any remaining infiltration in the testis, epididymis, and spermatic cord, if possible till it has been absorbed. For those who have a predisposition to tuberculosis, hereditary or otherwise, this course is to be recommended, because of the danger of the lodgment of tubercle bacilli in these indurations; general tonic and strengthening treatment is also indicated.

Inflammation of the vas deferens generally accompanies inflammation of the testis and epididymis. For prophylaxis the same course is needed as for the others. If, for example, during the course of gonorrhoea deferentitis appears, we must try by absolute rest, elevation of the scrotum, and ice compresses to prevent the process extending to the testis.

SYPHILIS OF THE TESTIS

deserves special mention, because in the form of gumma it frequently attacks the testis early, and, if it is bilateral and accompanied by secondary induration, it produces atrophy of the testis and sterility, which can only be prevented by timely treatment.

TUBERCULOSIS OF THE TESTIS

See the chapter on "Urogenital Tuberculosis."

UROGENITAL TUBERCULOSIS

In this section we are concerned only with chronic, not with miliary tuberculosis. The several parts of the urogenital tract may be attacked by tuberculosis. This may reach the part (1) by the blood-stream. The tubercle bacillus may remain lodged in the glomeruli of the kidney, also in the vessels and lymph passages of the prostate, the testis and epididymis, rarely in those of the wall of the bladder. (2) It may pass with the urine into the renal tubules ("excretion-tuberculosis" of Cohnheim), renal pelvis, ureters, and bladder. These two modes of infection occur especially in patients who suffer from tuberculosis of other parts. It is extremely probable that a large number of cases among

healthy people arise in this way. (3) Very seldom the tuberculous process has extended to the kidneys from other adjacent parts, for example, from tuberculosis of the ribs, vertebrae, and suprarenals. (4) The tubercle bacilli may also enter the urinary passages from without per urethram. Primary urethral tuberculosis has not been proved to exist, but it is certain that infection may be caused by coitus, dirty catheters, and perhaps also by clothes. The structure of the prostate with its sieve-like mucous membrane will then afford the best breeding place for tubercle bacilli. In the development of urogenital tuberculosis, gonorrhoea is of great significance; chronic gonorrhoea provides places of diminished resistance in the posterior urethra, prostate, bladder, vesiculae seminales, testis and epididymis. In the previous pages we have repeatedly pointed out the necessity for carefully removing any remnants of this disease. We have also insisted on the need of tonic treatment for patients who have any hereditary tendency to tuberculosis, who are scrofulous, or anaemic, who have apical pulmonary catarrh or tuberculosis in any other parts, and who become affected with gonorrhoea. This general tonic treatment may also be recommended as a prophylactic for such patients though they have not yet any gonorrhoea. Such patients should be told by the physician that gonorrhoea would be extremely dangerous for them. If tuberculosis has attacked the urogenital system, it is unfortunately generally only a question of time and idiosyncrasy when and which part of the whole apparatus will become infected from the first focus of disease. For prophylactic purposes, therefore, one should not hesitate but at once remove the whole of the diseased focus, if possible. This is easiest in the case of the testis and kidney, which can be simply excised; in the bladder the tuberculous ulcers must be destroyed by corrosive sublimate or guaiacol. Before removing the kidney we should make sure that there is a healthy second kidney. Early removal of the testis will also protect best against tuberculosis of the other testis and against miliary tuberculosis of the peritoneum. The nutrition of those who have uro-

genital tuberculous disease should be maintained as in the case of those who have pulmonary tuberculosis. In tuberculosis of the bladder and posterior urethra, catheterization should only be resorted to when urgently required, because it often aggravates the disease.

NERVOUS DISEASES OF THE UROGENITAL TRACT

Pruritus pudendorum, and more rarely true neuralgia may affect the skin of the external genitals as the result of a general nervous condition or disease of the urogenital system, such as chronic gonorrhoea, or sexual neurasthenia.

The neuroses of the urethra may be sensory, that is the most diverse kinds of sensation from unpleasant up to painful ones, or abnormal sensations may be present. They may also be motor,—urethrospasm, and urethroparesis; with the former, micturition may often be impossible; with the latter, the laxity of the urethral musculature makes it impossible quickly to force out the last drops of urine, hence dribbling of urine occurs. These conditions are seldom due to disease of the spinal cord or general nervous disease, but are generally due to slight changes in the urinary passages themselves. They are especially due to those changes which chronic gonorrhoea causes in the posterior urethra and prostate, and to onanism with its consecutive irritable symptoms, especially in people with a nervous predisposition. The local nervous disorder may long outlive the morbid process which originated it. We have already given the prophylaxis of the original affections. Less often there may also be present phimosis, a small meatus, abnormal acidity, or some other alteration in the urine (diabetes), or some rectal affection. In passing an instrument we should use the greatest gentleness with those patients who have hyperaesthesia and much pain, and no force should be used when urethrospasm resists the passage of the catheter. Sensory neuroses of the bladder sometimes appear as pain, sometimes as an increased or as decreased desire to urinate. Frequency of micturition may be purely nervous and is very liable to attack neurasthenics, but may also affect

those who are otherwise healthy. We find it also in disease of the bladder, prostate and posterior urethra, with calculi and with phimosis. Sometimes also it may occur in connection with menstruation, pregnancy and other affections of the female genitalia. It may also occur when the urine is excessively acid, and after the administration of cantharides, methylene blue, or urotropin. Only in some of these cases can one speak of a neurosis. Diminished desire to urinate occurs especially in spinal affections.

Nervous dysuria, that is an inability to empty the bladder without obstruction, is met with in spasmodic contraction of the sphincter of the bladder and of the urethra; it occurs more especially in neurasthenics and under conditions similar to those which give rise to urethrospasm. Nervous dysuria may also occur in paralysis of the bladder. In those who are mentally diseased, and in disturbances of consciousness, as in coma, but also when the mind is perfectly normal, symptoms of complete retention or of retarded or difficult urination may appear. The most frequent causes are diseases of the spinal cord; next, neurasthenia, hysteria, and multiple neuritis; but local processes too, such as stone, chronic urethritis, disease of the prostate and stricture, may produce paralysis of the bladder reflexly. Retention of urine from a nervous cause is met with as the result of affections of the spinal cord; often it occurs in hysteria and neurasthenia; it may also occur in those of unsound mind. Independently of the will, the urine then remains in the bladder in consequence of inability of the patient to pass it. Retention of urine may spontaneously or after catheterization give rise to cystitis. Nervous incontinence, in which there is dribbling of urine, is when the bladder is emptied independently of the will, in consequence of loss of tone in the sphincter, with or without paralysis of the detrusor; this is met with principally in diseases of the spinal cord. The expulsion of large quantities of urine occurs in affections of the spinal cord, in loss of consciousness, in epileptic attacks, and very often in children during sleep, as nocturnal eneuresis. In nocturnal eneuresis other factors are

concerned, for example: rickets, anaemia, hereditary mental taint, nervous disease, onanism, intestinal worms, parasitic skin affections, eczema, and diseases and abnormalites of the genitalia.

Renal colic and nephralgia are not always a result of organic nerve disease, or the presence of calculi, but very often they are the first sign of a commencing affection of the spinal cord, as in tabetic crises. In other cases of tabes the pain radiates from a point in the urogenital area. As the cause of tabes is probably syphilis, this should be treated, and any urogenital affection, so far as it admits of treatment.

Nervous functional anomalies of the kidney appear in hysteria in the form of anaemia and scanty urine, and sympathetic disturbance of one kidney when the other is injured. Diabetes insipidus possibly belongs to this category. Nervous oxaluria and phosphaturia are often seen. We should treat the weakness of the general nervous system; but there is no more definite prophylaxis in these diseases, which are still so obscure.

The neuroses of the prostate may appear as hyperaesthesia of the whole organ, or of the urethral part only, or as irritability of the muscular part. General hyperaesthesia of the prostate is often associated with other nervous troubles; the commoner urethral forms are also apt to be combined with motor neuroses. The prostate may also occasion all kinds of neuralgia of the genital area, diminution of feeling in coitus, impotence, spermatorrhoea, and detrusor spasm. Irritability of the muscular part was referred to above in speaking of the bladder. Neuroses of the prostate are met with in neurasthenics, and above all in cases where some local affection has been left by gonorrhoea or onanism.

The testis and spermatic cord are often affected by neuralgia, the cause of which is said to be excess in venere, adhesion of the testicle after operations for hydrocele, narrowing or occlusion of the vas deferens as the result of previous inflammation of the testis and epididymis, varicocele, spinal disease, stone, and the diseases

of the urogenital tract mentioned above, especially of the prostate, and prostatic part of the urethra.

To state it briefly: the nervous affections of the urinary passages have very many causes and require different forms of prophylaxis. Above all, the chief cause of it, neurasthenia, must be treated. This may already be potentially present in the child. But it does not develop apart from external influences, and among them are overfeeding with unsuitable food, wrong training as regards eating and drinking, emotional and mental excitement for which children are not fit, and the air of towns. Other causes are onanism, excessive mental and sedentary work, too little exercise, modern tendencies in music and painting, the foolish hurry in all work, increasing irregularity of life and desire for pleasure, misuse of alcohol and other poisons, and over-valuing of one's knowledge and worth. A sensible training will prevent much of this. Neurasthenia is the more dangerous when it happens to be combined with anaemia, coitus interruptus or chronic gonorrhoea; for these produce changes in the prostatic part of the urethra and prostate which provide the needed local symptoms for patients suffering from general neurasthenia. But other diseases too, of the kidneys, renal pelvis and bladder, especially stone, may sometimes cause neuroses of the urinary passages. The prophylaxis and treatment of these have already been described. Less often do we find neuroses whose cause is an abnormal condition of the urine (increased acidity, phosphates, oxalates, or sugar). All over the body similar symptoms may arise, principally through the action of chemical and thermal stimuli on the sensory nerves, but probably only in individuals predisposed to neurasthenia. Hysteria, which is allied to neurasthenia, acts in the same way, as do also states of exhaustion, as anaemia and chlorosis. Lastly, we must mention disease of the central nervous system, especially of the medulla oblongata, and purely psychical influences as fright, anxiety, or shame. The prophylaxis is obvious from what has been said already.

SPERMATORRHOEA

The causes of this affection are diseases of the central nervous system, especially of the medulla, pulmonary tuberculosis, diabetes, acute febrile diseases, especially typhoid; but above all, general neurasthenia, onanism and organic changes of the posterior urethra through gonorrhoea. The three last-named causes may be associated together and to a certain extent are dependent one upon the other. The prophylaxis of the main affection has been given in another part of this book, and partly also in the chapters on gonorrhoea and onanism. Treatment of the chief affection, especially of the neurasthenia, must be energetically carried out, but into this we cannot here enter further. The treatment of this affection is specially important, because it will prevent the development of severe neurasthenic and hypochondriacal affections and the danger of impotence.

Impotence in the male in which either the erection is absent or incomplete or where there is premature or late ejaculation may be the result of deformities of the penis. Among these are congenital malformation, scars after injury and gonorrhoeal or syphilitic inflammation of the erectile tissue. Deformities of the penis from chancres, cellulitis, abscess, or involvement of the penis in large inguinal herniae, hydroceles or elephantiasis, and lastly tumours of the penis itself may also give rise to these conditions. Details about the prophylaxis of these affections have already been given. General disease may also diminish virility: thus, chronic morphinism, cocainism and alcoholism, diabetes, chronic nephritis, disease of the brain and spinal cord and cachectic conditions. The prevention of these diseases has been described elsewhere. There is greater opportunity for prophylactic treatment in neurasthenia. Neurasthenics are very common, and are for a time impotent, whether the affection has been brought on innocently or by onanism and immoderate sexual indulgence. Combined with neurasthenia, chronic gonorrhoea with its after effects is an important cause, gonorrhoeal neurasthenia as Fürbringer calls it. But simple psychical impotence may also occur.

There may be defective erection as the result of bashfulness, or fear at the first attempt, as by a simple reflex process is not uncommon in young married men. Perverse sexual feelings may at last make coitus impossible. Mental overstrain temporarily at least diminishes sexual activity. The prophylaxis of this form of impotence consists partly in avoiding the excessive mental activity and partly in treating it. Simple psychical impotence which sets in without sexual perversity or previous excessive or perverse sexual intercourse may be best prevented by time and rest. Absolute abstinence, which is also of good effect therapeutically, should be recommended, because it will not be observed if sexual feeling and love become stronger than the mental inhibition, and as a rule will prevent the return of the trouble later. In every case one should caution against forced attempts to supply the deficient erection.

A few words now as to sterility in the male. The absence of any seminal emissions, and deficient ejaculation may be due to the same causes as psychical impotence, but they may also appear as the result of disease of the urethra and prostate; this is generally ulceration, and cicatrization from the openings of the ejaculatory duct to the meatus. Absence of spermatozoa may occur in affections of the central nervous system, in cachectic conditions, in disease or after inflammation of the testicle, and above all by occlusion of the seminal passages as the result of epididymitis or deferentitis. We have already mentioned all these diseases and their prophylaxis. The treatment of a stricture and of infiltration of the urethra is also of prophylactic value.

Sexual neurasthenia comprises those neurasthenic conditions in which symptoms of "irritable weakness," excessive excitability and early exhaustion of the genital nerve centres are primary or specially marked; it is the chief source of all the symptoms mentioned in the chapter on "Nervous Disease of the Urogenital Tract." It has its root in neurasthenia and in the allied local functional disturbances of the urogenital apparatus. Everything which combats neurasthenia acts favourably, because as a rule the psychical effects of sexual affections

do not last long except in neurasthenics. Shame, which unfortunately comes too late, then produces psychical depression, and the patient becomes hypochondriacal and the victim of advertising specialists and publishers of books which paint the results of sexual disease in the darkest colours. Onanism and chronic gonorrhoea may indeed bring about changes in the prostatic part of the urethra, and the cure of these conditions, as already stated, is a good prophylactic of sexual neurasthenia; but upon the whole, mental ideas are the source of these local troubles. Is it not possible to do something to get rid of these "popular writings" and swindling advertisements? The chief source of all sexual neurasthenia due to local disease is the prostate, that is chronic prostatitis. Doubtless balanitis, preputial calculi, phimosis, or a narrow meatus may favour it; but easy as would be then the work of prophylaxis, we have to confess that the effect of these diseases is over-estimated, or as Eulenburg thinks, we attach far too little value to the onanism produced by these diseases though it is certainly much more important than they are. In the general part we have already spoken of the important influence of coitus interruptus, but other sexual excesses, immoderation, and perversities bring in their train physical or psychical impotence, aspermatism, and premature ejaculation. If such conditions have already developed, the physician must remember that he must guard the dignity of his profession. Whether it is compatible with his dignity to prescribe pessaries, and similar apparatus, we leave undecided; in every case it is wrong to advise illegitimate coitus for a sexual neurasthenic. It is especially difficult to decide what should be done about marriage. We may do untold mischief if we tie a happy woman to an impotent feeble man, or a chaste young woman to a profligate. We should not advise a sexual neurasthenic to marry unless we are convinced, after treating him, that he is fit for married life.

The Prevention of Venereal Disease and of Disease of the Skin

BY

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OF BERLIN.

The Prevention of Venereal Disease and of Disease of the Skin

Up to the present, no great results have been recorded in the prevention of venereal disease, and this is due to the difficulty which exists in devising effectual regulations. Yet it is worthy of most serious thought. That things cannot go on as they are is the conviction both of the laity and of the profession. Even amongst those by whom from a moral standpoint the expectant attitude, if not indeed an attitude of opposition to prophylaxis, is taken up in respect to venereal disease, a change of opinion is noticed directly a member of their own family is attacked by the infection. Physicians not seldom have an opportunity of seeing men in distinguished positions who previously had dismissed the subject with a shrug of the shoulders, suddenly awaking to the importance of the matter when one day they make the discovery that a son has been infected with syphilis or gonorrhoea.

The great prevalence of venereal disease and the danger which threatens every one, sometimes even the innocent, make it desirable briefly to review the prophylaxis which is applicable. We must confess, before beginning, that we have nothing new to say and that similar proposals have for centuries been again and again made by medical men. But if legislators upon whom the actual arrangement for defence against these diseases must depend, have hitherto remained deaf to the multitudinous appeals on the subject, that will not prevent us from warning again and again against this dangerous indiffer-

ence, so that the danger may not some day become a pestilence the removal of which will be even more difficult than at present.

Compared with venereal disease the prophylaxis of skin diseases is far less important, and we shall therefore first consider the former.

A. The General Prophylaxis of Venereal Disease.

Corresponding with the three forms of venereal disease, the prophylaxis of venereal disease must comprise the prevention of syphilis, of soft chancre, and of gonorrhoea.

Doubtless all three affections stand in close relation with prostitution. The supervision of this is the only prophylaxis which the State can offer to the individual. Prostitution dates back as far as the history of the world. Only idealists who stand apart from practical life, can hold the opinion that we could do without prostitution at the present day. So long as men exist, hunger and the sexual instinct will always be the strongest incentives to human action. Under the present conditions of existence, which become more and more difficult, it is impossible for each individual to found a family early. Peterson reports (International Conference at Brussels, 1899) that in the year 1890 about one-third of all the inhabitants in St. Petersburg, who were at the age for active sexual intercourse, were still unmarried. For these there is therefore no other way of satisfying their physiological sexual needs than by means of prostitution for the time. There are, in our day, probably few men who enter into marriage in the virgin state. Nevertheless, from the standpoint of prophylaxis one must refer also to the question whether sexual abstinence is injurious for a strong, healthy man. How long such abstinence is possible without subsequent disadvantage will vary according to the natural disposition. The opinion will probably be held by all, that one may counsel such abstinence for a weakly, anaemic individual, or one who is hereditarily predisposed to nervous disease or tuberculosis.

But also in those cases where the man is strong and robust, wise hygienic measures may prevent him from yielding too early to sexual intercourse. Adequate bodily activity, sport of all kinds, and abstinence from alcohol are very helpful in preventing the inclination for sexual intercourse from being aroused too early. Unfortunately, the experience of doctors, especially in large towns, shows that youths of only sixteen or seventeen years of age often have to be treated for venereal disease. Careful inquiry in these cases shows that they had not themselves any inclination for sexual intercourse, but that they were solicited by prostitutes and thus made to exercise the sexual functions. A great mistake is here made in the bringing up of the young, and most parents, teachers and masters draw the attention of those committed to their charge to the dangers of sexual intercourse, only after they are already infected with venereal disease. One should draw the attention of youths to the dangers of prostitution before their sexual inclinations are awakened. It is obvious that the way and manner in which one depicts the consequences of sexual intercourse to the youth, probably of sixteen years of age, must depend upon the individual case and require much wisdom and knowledge of human kind. For, if the counsel is not given in the right way, it may do harm rather than good. Parents and teachers in large towns especially, should not neglect to give attention to this matter. We must be careful also not to depict sexual intercourse as wholly inadmissible and thus by frightening the youth force him into masturbation. Although my experience has led me to the opinion that the injuries to health which are said to be the result of onanism are much exaggerated, yet it cannot be denied that when continually practised, onanism produces neurasthenic conditions. Here again we must give advice suited to the individual case, and so avoid making an abstainer into an onanist.

My opinion is that in a healthy individual with no nervous predisposition, abstinence can hardly produce any disturbance in health whatever. But this presupposes that proper hygiene is at the same time carried out. The unani-

mous opinion of all physiologists is, that up to a certain age, till about the beginning of puberty, the nutriment supplied to the youth's body should be such as will not unnaturally accelerate maturity. The great weight which, especially among the higher classes, is laid upon a diet rich in meat, the addition of spices and condiments, and the early use of alcohol although only in small quantity cause the developement in these boys and girls to occur earlier than in the children of the lower classes whose diet from the necessities of their conditions contains more vegetables and less alcohol. It is self-evident that whenever practicable one will direct sexual intercourse into the right channels by early marriage.

But, as already pointed out, most men yield more or less often to prostitution before they enter into marriage, and the question arises what injurious effect upon health may prostitution exert?

All experienced physicians are agreed that these dangers are very great, and that the sexual diseases which are the result of prostitution do more to sap the strength of nations than all the wars and accidents. There are many statistics which give these injurious effects numerically. Thus, for example, Blaschko believes that every ninth or tenth individual in Berlin has had syphilis. According to his estimate, in Berlin, twenty to thirty per cent. of those affected with venereal disease had syphilis and sixty to seventy per cent. had gonorrhoea, so that the annual figures would give some 30,000 to 36,000 who were suffering from gonorrhoea. In Russia, so Petersen reports (International Conference, Brussels, 1899), in a small university-town twenty-four per cent. of the students who had completed their studies were infected with syphilis, and in a manufacturing town forty per cent. of the employees had syphilis. Naturally, all such statistics have only a relative and no absolute value. But the inference may probably be drawn that, with few exceptions, every prostitute becomes affected with venereal disease at some time or other. It is only a matter of time as to when they will become affected and by which venereal disease. Every time therefore that a man avails himself

of prostitution for satisfying his sexual instinct, it is a mere chance whether or not he will become affected. And this not seldom brings anxious patients into our consultation-room, who after a doubtful coitus come to the doctor daily to know whether they have become infected. The consequences of syphilitic infection are relatively less dangerous than those of gonorrhoea, a point to which we shall again refer later. With the former, prostitutes are highly infectious for those who resort to them for only two or three years after the commencement of the disease. According to the valuable researches of Le Pileur, the greater number of prostitutes become infected with syphilis at the age of eighteen to twenty years, and it seems therefore that the older ones are comparatively less likely to be infectious. But it must be borne in mind too, that it is the younger individuals who are most sought after. The case is different with gonorrhoea, which is seldom or at least not often thoroughly cured during the patient's stay in hospital, undergoes exacerbations through various influences and exposes those who resort to these women to great dangers. But here again more recent hygienic measures and treatment of venereal disease must and can do something to reduce this, though possibly only gradually at first.

From these considerations, it is obvious of how great value, adequate supervision of prostitution would be in the prophylaxis of venereal disease. By it alone will it be possible for the State effectually to check the spread of venereal disease; by it alone can protection, although at present only slight, be afforded to the individual.

In regard to this, there are two opinions which stand directly opposed to one another. The one side regard regulation, the strict police supervision of prostitution as best. The abolitionists, on the other hand, desire to remove the dishonour and shame of such police regulations. Their ideal is to remove prostitution altogether. And while this is being done, the abolitionists desire to see equal rights extended to this class of women as to all other members of society.

Among many other reasons which the abolitionists give for holding this opinion, there are two which need to be specially referred to here. There is first the general moral principle by which every woman may claim the same rights before law as the man. Legislation today certainly does not look upon prostitutes as those carrying on a trade, as the State regards them, but treats them almost as criminals. From the medical as well as from the purely humane standpoint we desire to see an existence fit for human beings provided for prostitutes. Yet this is not the same thing as removal of prostitution, and it is possible only for short-sighted humanitarians today still to maintain that society could exist without prostitution. The second and more important reason which abolitionists give is, that all the regulations which exist today for the regulation of prostitution have done nothing to prevent sexual disease. On the contrary, according to their opinion, registered and controlled prostitution contributes to spread venereal disease.

Upon what opinion is this based? Mostly upon statistics. Yet the general opinion is that all such statistics prove very little. Every statistician arranges these facts from his own point of view, and the results are different, according as he desires regulation of prostitution or wishes to see it abolished. In determining whether regulation of prostitution can prevent and check, or even remove venereal disease, there are many other points to be considered, which statisticians have hitherto not weighed sufficiently. Until such statistics are available, the impression of most physicians is, probably, that careful control and regulation of prostitution is alone able to check the terrible spread of venereal disease. The chief stress here must be placed upon careful medical control, and unfortunately this is altogether wanting—certainly not from any reason which depends upon physicians, but chiefly from financial reasons, and because adequate information is still not obtainable. But it must be confessed that the administrative authorities are in a difficult position, because the measures proposed by physicians differ so greatly and are frequently based upon Utopian prin-

ciples. We must not ask for the impossible, but should begin with measures that can be easily carried out, and later, when these have worked well, proceed to others. But most physicians who have experience in this matter are inclined to think that thorough medical control can alone do any good, and that neglect of control can do very great harm. This experiment in a few countries (Italy, England), where prostitution has remained free and uncontrolled for a few years, has already given rise to serious results. There is however great diversity of opinion about the form of control. One important point is this: Should prostitutes be lodged together, or should they remain scattered and live alone? One side brings forward a number of reasons which show that if prostitutes are lodged together, medical control of the prostitutes will be easier than if they dwell apart. The opponents maintain that in spite of this living together, or even because of it, venereal disease is not rarer in such houses, but even more common than when the prostitutes live alone. After working through the enormous literature on the subject, and with the latest statements made at the Brussels Conference in 1899, one comes to the conclusion that the existing statistics prove nothing, and that no decision can be arrived at from them. To me personally, as to Jadassohn, the middle course seems the best. I am no opponent to lodging prostitutes in special houses; but, on the other hand, I should also support the living alone of prostitutes. I agree with Jadassohn, and think that it is most advantageous to let both systems, isolated prostitution and prostitution in special houses, be carried out side by side. One must be guided by existing conditions, and the arrangements met with will be different in different towns.

In large cities, as in Berlin, the closing of licensed houses has led to an intolerable state of affairs. In towns, as for example in Hamburg, where prostitution is confined to certain houses, the streets remain free from prostitutes. On the other hand, it seems that in cities where the system of licensed houses does not exist, as in Berlin, it is not safe at certain hours of the day for ladies to venture alone in some of the streets. Moreover, it is not astonishing that young people,

students, tradespeople, or workmen, find it difficult to escape such allurements on their way home in the evening. By this removal of licensed houses, prostitutes are forced to get their living on the streets, and often enough a young man who had no desire for cohabitation on a given day has, to some extent, been persuaded into it by the solicitation of a prostitute. In view of this, the barrack-system has many advantages, and these seem to me far to outweigh the inherent disadvantages. Above all, medical control is more easily carried out by the licensed house system. It cannot be denied that this medical and police control requires to be considerably improved in many ways, and that from the medical side the demand for thorough changes must be made.

For it is certain that a careful medical and a humane police control can alone help to check the spread of venereal disease, while with freedom and but slight supervision, secret prostitution, with all its disastrous consequences, will become more common than hitherto. It is estimated at 25,000 already in Vienna; at 30,000 in Berlin; and at about 100,000 in Paris. And it is acknowledged almost on every side that it is secret prostitution which mostly leads to the spread of venereal disease. To limit secret prostitution a humane administration must place the medical aspect in the foreground, and give to it the decision in all technical details. It is obvious that adequate rules can only be devised by consulting those who understand the subject. Sanitary commissions should be appointed in every large town, and should meet from time to time to consider any question proposed. The following proposals, which are mostly to be found in current literature and to which I have made a few additions, are intended only to serve as a sketch, which can be further filled in.

First, we must endeavour to get frequent and careful medical examinations. We need not here enter more fully into the details. For, if for this control trained physicians are appointed, and these can be found in every town, it is obvious that a thorough examination will be made. The only question is, how often should it be made? In this

matter the arrangements in different towns will be somewhat different. The regulation which exists in Antwerp for a daily examination, will be for most towns, and especially large cities, quite impossible. For prostitutes living in registered houses, examinations should, I think, at present be made twice a week; for those who live alone, it seems desirable to examine them three times a week. I must admit that this is to a certain extent only a compromise. If financial considerations could be omitted, a careful medical examination should be made daily. But in order that this may be carried out in the most humane manner, the proposals of Fournier, Neisser and of others, must be considered. The examination and treatment of prostitutes should as far as possible be carried out in the outpatient department whenever it is not necessary that they should remain in hospital. All physicians and authorities are agreed that every prostitute should at once be confined to a hospital directly any form of infectious venereal disease manifests itself. The existing hospital accommodation is far too scanty for this. Physicians will heartily support the suggestion that more hospitals should be built, and that in each of these as large a part as possible should be reserved for venereal disease. In London, according to Drysdale, in the year 1867, with about 6,000 prostitutes, there were only 150 beds for women with venereal disease, while, according to Acton's calculations 1,450 were required, and in the year 1895, 2,500 beds were needed, because of the population, which had become almost twice as great. How very small is this number compared with what is needed. It is sad to see that not only in our small towns, but even in the large cities where there are many hospitals, how small a part is reserved for patients with venereal disease. According to Lesser, there are in the public hospitals of Berlin only the incredibly small number of 153 beds for men with venereal disease, and 410 beds for women. Indeed, it is not even possible for a paying patient suffering from a venereal or skin affection to be admitted into a special part of a Berlin municipal hospital, for the simple reason that there is no accommodation. But in the new fourth

municipal hospital in Berlin accommodation for such cases is to be provided. How long will it be before similar arrangements are made in the older hospitals? Even when sufficient hospital accommodation exists for all prostitutes who have venereal disease, and for others with venereal disease, one essential point has still to be considered. Neither syphilis nor gonorrhœa, especially in women, can be permanently cured by one period of residence in a hospital, even though it extend to weeks. After a shorter or longer interval signs of infection will again arise. With syphilis indeed the first stay in hospital is of very little value. It may be that a few days or weeks later, papules appear on the genitals or some other part of the body, which may readily cause infection. It is therefore necessary either to institute a daily examination of each prostitute in order to send her into hospital when the slightest sign appears, or to treat her at an out-patient department.

Whether daily examination, even in Antwerp, is really carried out, seems to me questionable. Probably it would be difficult to carry it out and it could only be done at considerable expense. And the space and beds in hospitals at present would not suffice, if one were, for example, to compel every prostitute who has had syphilis to go into hospital each time that herpes progenitalis appears. For such herpes, which is innocent in itself, may, when it appears in an individual who has possibly been infected only a short time before, very easily convey the virus, while in a healthy woman there would be no such danger of infection. Moreover prostitutes would by all possible means evade an examination, which already is not liked by them, and it would necessitate so large an amount of police inquiry that the most serious disturbances might be feared.

But the object could be attained by treatment at an out-patient department. The examination of prostitutes would thereby also lose the odium which has hitherto been attached to it, and the place of a police surveillance would be taken by medical examination. We may assume that this would always be done humanely, and the chief physician of such

an institution might be given extensive discretionary power, so that in a given case he might at once secure the admission of a prostitute into a hospital, and in other cases be responsible for the regular treatment of the woman as an out-patient. Whether these out-patient departments should be associated with the hospitals, or should be established independently of the latter, is a question of minor importance. It seems to me that it would possibly be best, if in larger towns we were to establish as many of such institutions as possible, which the women could attend, and where they would receive free medical treatment. There might be such an institution in every district of the town, which all physicians living near might attend if they so wished. The honorarium given to the physicians by the community should not exceed a moderate amount. If there were a head physician over each of these institutions, an arrangement recently introduced into Prague, adequate supervision would have been provided. At the same time, statistics and science would derive many advantages from such a method, and the prostitutes would be more content with such humane treatment than they have been hitherto.

Naturally, one hears from many quarters that these proposals are only half-measures, being directed against the women only, while the other and probably larger section of infected individuals, the men, are not dealt with. I acknowledge that this is so, and would even add from my own experience that men are often a much greater and commoner source for the spread of syphilis than are the women. In many classes of the community it is not considered wrong to seek sexual intercourse though the patient knows the infectious nature of his disease. We may meet with this opinion among educated persons in high social position as well as among working men. Meanwhile we must be content for the present with what is practicable and not desire the unattainable. And at present such examinations are practicable only among women. The fact is regrettable, but for the present we must adapt our measures to it. Let us hope for a change in the future. A few, Kromayer for example, desire a

general compulsory notification of men with venereal disease, but we must remember that such a method would necessitate notification by the physician. Very few patients would go to a physician who notified their venereal disease, even though without giving the name. We ought to be the advisers of patients and bound by professional secrecy. All proposals hitherto made in regard to men, except personal prophylaxis, which will be later mentioned, have proved to be utopian and have therefore failed to be carried out by the authorities. For the present, therefore, we must rest content with a better supervision and examination of the women.

The establishment of institutions in every district might even remove this want which is felt and lamented by many, and the men as well as the women might be treated there and receive free treatment. All such new hygienic proposals obviously meet always with active opposition, often for financial reasons. The question is raised, who is to provide the honorarium for the physicians, and from what fund are medicines to be provided. The following suggestion seems to me worthy of mention. If one does not wish in these cases to ask the State, that is the community, to pay taxes to defray the cost of free treatment of patients with venereal disease in such institutions, one alternative remains, and the patients themselves must pay for this better hygienic supervision for their own welfare. The first proposal, that the money should come from the pockets of the tax-payer, as is done in Sweden, would probably meet with great opposition in Germany and make the whole plan unpopular. The question arises whether the second plan may not be possible.

For a number of years we have had in Germany a sick fund law by which every workman is obliged to join such a fund. By this beneficent arrangement the members obtain from their own funds free medical treatment, free medicine and in case of inability to work, they may demand sick pay or to be taken into a hospital. But prostitution is, as physicians and most lawyers acknowledge, a trade, yet those who practise it have hitherto received scarcely

any protection from the State. Has not the time come when the advantages of this beneficent law should be extended to this trade? Some moralists and abolitionists will raise the objection that such would only increase the evil and possibly tempt girls to follow this trade more than hitherto. This fear need not trouble us, for there is little probability of such a result. We are striving after better hygiene, and to attain this end the method just proposed seems desirable. By introducing cards for prostitutes, or possibly better still by Sperk's number cards, it would be possible to exercise a satisfactory control over prostitutes. The medical entry on the card would state the diagnosis and the day of examination. The raising of the contributions to the fund would be the work of the administration, as is the case in Bosnia and Herzegovina according to Glück's report to the Brussels International Conference. Moreover, Heinrich Severus recommends the formation of such a fund from regular contributions by the women. Great difficulty would certainly arise at first. But the more the prostitutes see that a humane treatment awaits them and the weekly contributions to the fund are only trivial, while much is done for their welfare, the more will they gradually gain a feeling of greater moral independence. They will feel that now at least they are being treated as human beings. When the chief physician of the polyclinic diagnoses some infectious disease in them, their incapacity to pursue their calling must be stated as in other trades. Here also, as is the case with all members belonging to these funds, the physician will decide whether the patient is to be described as incapable of work, or whether she is to be sent into hospital. The latter would generally be the rule, and all cases of suspicious general or local disease which might become infectious should be sent for admission into hospital. A list kept by the chief physician and handed in to the police would enable an understanding to be arrived at between the medical authorities and those who have the supervision. But incapacity for work might also be the result of other non-infectious diseases which have nothing to do with that trade. If a prostitute suffers from an innocent

eczema or psoriasis, she might also while incapable of work receive the benefits of sick aid.

An equally important work of the institutions would be this: that the chief physician could thus best succeed in submitting any who had become infected with syphilis to a prolonged intermittent treatment with mercury according to Fournier and Neisser's method. However much physicians may differ in their views about the principles of treatment for syphilis, yet all are agreed that for prostitutes such a prolonged intermittent treatment should be adopted. From such an institution the physician could send the patient infected with syphilis into hospital for treatment every six months during the first two or three years after infection. I do not agree with Flesch, for I think that the State has the right and even the duty of admitting prostitutes into hospital for treatment. Not only when they are ill, but in the intervals when they are free from symptoms they should be admitted into hospital every six months for mercurial treatment. If the treatment is carried out humanely, all compulsion avoided and the prostitutes belong to a fund, they stand upon the same footing as other members of sick funds. According to the medical view syphilitic prostitutes are incapable of work at certain times and therefore we have a right to ask that they should be admitted into hospital for treatment. The costs which are not covered by the contributions of the women should be made up by contributions from the State and community. Probably private beneficence would also aid in various ways. As infection in syphilitic patients lasts only two or three years, it is easy to see that admission of prostitutes into hospitals every six months is not utopian. It is an object worth striving for, and though we should not see the result all at once, yet we should expect to see a gradual and very considerable diminution in the spread of venereal disease.

Instead of these measures, many have proposed that prostitutes who have become infected with syphilis and have undergone the first stage of treatment should be transferred while they are infectious during the first two or

three years to workhouses, where they would undergo treatment and would not go out till the time when they were very slightly or no longer infectious. Naturally, nothing could be said against such a proposal, if it were not for the enormous expense which it involves and which makes its realization impracticable so far as one can see. It cannot be denied that such workhouses and convalescent homes would be of very great use. When Schmölder maintains that such houses for convalescents are not necessary, one replies that in this way prostitutes can be most easily kept from intercourse during the probable two years of infection and could go back to the hospital for special treatment. The difficulty about financial outlay would be partly settled by the prostitutes, who could be given easy work to do for the community, the State or private individuals. Indeed they might possibly also put aside a small sum which could be handed over to them on their discharge. Moreover we must not overlook the fact that benevolent associations would have a better opportunity than hitherto of influencing the women for good and getting them to follow some other trade. But we cannot deny that the whole matter is difficult to carry out.

But instead of this, special out-patient institutions would for the present exercise a very beneficial influence if they had the discretionary powers which we have pointed out. This would be of advantage not only to prostitutes but also to the numerous women practising secret prostitution, who have hitherto come under no control. The fact that for small contributions to the funds they could get medicine gratis without fear of being notified to the police would surely induce many of these to come for medical treatment when they need it. The unanimous opinion of all specialists, and my own experience coincides, is that these unregistered prostitutes are responsible for most of the spread of syphilitic and gonorrhoeal infection, and yet they have never hitherto had an opportunity of getting medical aid conveniently and without charge. The few private dispensaries which exist for this purpose are quite insufficient. The establishment of district institutions would alone remove this evil.

Naturally as a sequence to this, we must demand that those with venereal disease should be admitted into hospital without payment if they bring a medical certificate. The cost of this would not be very great. By previous systems these in-patients were obliged to pay for themselves; or when they could not, so many inquiries were made and unpleasantness arose, that these unfortunate women with venereal disease were really kept away from the hospitals. This would be prevented if they were admitted free of charge. Unfortunately there is the fact that we have far too few hospitals for the reception of cases of venereal disease. I hold the opinion of most specialists, that it is not desirable to establish special hospitals for venereal disease. But in every municipal or government hospital there should be accommodation for cases of venereal disease, and these should in no way be separated from the rest. This is not the place in which to go into further details about this question. We desire here only briefly to point out suggestions for various improvements. These proposals are not, I think, utopian, and if the administrative authorities will look into them they will find them practicable. In this way we may, in course of time, arrive at better prophylaxis than before. Until possibly a discovery analogous to Behring's enables us to cure, or possibly even prevent, syphilis by a prophylactic specific serum, the sanitation of prostitution is one of the most important tasks for prophylaxis.

Till that is done there remains chiefly personal prophylaxis and this will be described in special chapters, corresponding to the different affections.

1. The Special Prophylaxis of Syphilis

No absolutely certain means by which the individual can protect himself against syphilitic infection is known, nor does it seem likely that we shall know of any such means for the present. Until then the individual can only use palliatives, which only in a restricted sense can be regarded as prophylactic measures. This does not at all mean that unlawful sexual intercourse is deprived of its great dangers by personal prophylaxis, any more than can

the most careful control of prostitutes render those who visit them safe from infection.

Very special significance attaches to the question whether ritual circumcision can be regarded as a protection against syphilitic infection. We know that infection in coitus is never through the uninjured epithelium, but occurs most easily through small lesions which maybe of a very trivial nature, and the thought therefore occurs that circumcision offers great advantages. The normal glans penis, and the prepuce with their delicate epithelium which can so readily become abraded, especially when the preputial secretion decomposes and the parts are not carefully washed every day, enable the virus to lodge there more easily than does a glans which being to some extent deprived of its protecting envelope resembles more the rest of the horny epidermis. Whether such is the case could only be established by many statistics which would show whether those individuals who were circumcised in their youth suffer less from venereal affections than those in whom the prepuce has not been removed. Syphilis and soft chancre only would have to be considered in these statistics. But in most of the questions here mentioned the latter plays a quite unimportant part, so that statistics might be limited to syphilis. Circumcision can afford no protection against gonorrhoeal infection, because the gonococci enter by the normal urethra both in the circumcised and uncircumcised.

It is obvious that such statistics must be very defective and can afford no absolute proof. In such statistics the personal circumstances are too little regarded, and the danger to which the individual is exposed in his sexual life are not accurately estimated. A number of other factors also militate against the worth of such statistics, though there would be an approximate value to be attached to such an investigation. I do not know where any statistics taken for this purpose are to be found. From my own observations I can give the following data:

In my polyclinic, I saw syphilis in 1,250 uncircumcised and in 29 circumcised men.

In my private practice, I noted syphilis in 383 uncircumcised and in 71 circumcised patients.

I avoid drawing any conclusions from these small numbers. For in the first place it must be remembered that the percentage of circumcised to uncircumcised is a small number, about five per cent. of the number of inhabitants. Moreover in the numbers from the polyclinic we have to bear in mind that among the working classes there are relatively very few circumcised. I desire here only to make the suggestion in order that others may possibly also make observations. With a large mass of statistics collected by many observers it would be possible, I think, to arrive at some conclusion.

Ointments may be used to smear the parts before coitus and will diminish the chance of syphilitic infection. By recommending this prophylactic I have often seen good results. Several times patients have, after a suspicious coitus prior to which they smeared the genitals with ointment, sent the woman to me for examination and I have discovered that she has had a syphilitic affection. In spite of this, these men did not become infected with syphilis, as I was able to convince myself by watching them for years. Among these were several doctors who are now married, have healthy children and have never shown any signs of syphilitic affection. Even though no ointment is used, we know that every man does not become infected by a single coitus with one who is markedly syphilitic. Nevertheless it seems striking when one is able to make observations frequently such as I have mentioned.

Instead of this, so-called " preventives " have been recommended against infection with venereal disease. A substance is placed in the vagina before coitus which liquefying or dissolving during the act is to kill the germs of infection. But I have often seen infection occur after the use of such preventives. All these preventives though much praised, but without scientific reason, have been designed not so much to prevent infection with venereal disease as to prevent conception, a question which has nothing to do with the prophylaxis of venereal disease.

Compared with all these precautionary measures, the condom seems to me to afford the greatest security. I do not hesitate to recommend the use of this to each patient who comes to me for treatment, particularly in a large town. It is known that Dr. Conton, a physician who lived in London in the time of Charles II., first gave this invention to the world. I would not from the moral standpoint forbid its use, as did Parent and Duchatelet. I know perfectly well that it is no absolute security against venereal infection; that extra-genital infections more especially cannot be prevented by its use. With the enormous spread of venereal disease to-day, I consider it not only a necessity, but a duty for every physician who is asked about this, to recommend to the patient the condom as a prophylactic against venereal disease.

Formerly physicians held a different opinion on this subject, and in early years I myself avoided answering the question when a patient asked advice about a prophylactic. Now however the more I am convinced of the injurious effects of venereal disease, the stronger grows my conviction that it is the duty of the physician to tell the patient about this means.

A terribly large number of cases of extra-genital infection occur. It is said that in Russia entire villages have thus become infected, chiefly through extra-genital infection. Militchevitch reported that in Servia half the number of cases of syphilis are the result of extra-genital infection. In Germany too, this mode of spreading syphilis is increasing extraordinarily and it is becoming, as Holst says it is already in Norway, a source of increasing danger to many innocent persons, families and children. This *syphilis insontium* has often no relation with sexual intercourse, and innocent individuals often suffer infection from the thoughtlessness of a syphilitic man who gives them a kiss or comes in contact with them in some other way. In fifty cases which came under my own observation and which I published recently, women were more often thus affected than men, and this agrees with the opinion of most observers. The parts affected in order of

frequency were the upper and lower lip, the angle of the mouth, tongue, tonsil, nose, chin, abdomen and anus. In many cases little could be learnt as to the manner of infection. Frequently wind instruments and cigar-holders are the means of infection. Such occurrences might be prevented by observing the very simplest hygienic precautions. The terrible part of this extra-genital infection is that a whole family may thereby become affected, because the victims do not realize the nature of the affection till later, and in the meantime many have become infected.

There is no sure prophylaxis against extra-genital infection any more than against sexual infection. A few hints only can be given. One should avoid kissing on the mouth, for it would seem that syphilitic infection occurs probably only when the infectious material is conveyed from a syphilitic person to an injured place of the epithelium of a healthy individual however slight the injury. I knew of a cook who was acquainted for a year with a syphilitic man without becoming affected. One day when frying with some fat, she burnt her upper lip and a blister formed. The next time her syphilitic lover kissed her the syphilitic virus lodged there. Drinking vessels with any imperfection at the edge, however small, should not be used. It is possible that small injuries in the mucous membrance may be caused thereby, and that shortly afterwards some slight contact, a kiss for example, may infect it with syphilitic virus. So too with chancres through shaving, several cases of which I have shown at the Berlin Dermatological Society.

All such prophylactic measures will however be taken in only a small number of cases. The most important point is to tell the syphilitic person himself how great is the danger of his infecting others during the first two years of his disease. We must earnestly point out to them how great a misfortune they may cause by thoughtlessly inflicting extra-genital infection.

Finally let us point out that many otherwise respectable men resort to prostitutes only after taking excess of alcohol, and pay the heavy price of becoming infected by

this one transgression. The fact should also be widely circulated that immoderation in drink may frequently give the first impulse to venereal excess.

Thus the number of means at our disposal for personal prophylaxis of syphilis is very small, and the value of those given is probably not great. Meantime physicians cannot sit still and do nothing when, with or without the use of all these means, syphilitic infection has occurred. Then must begin our prophylactic treatment for syphilis. Then we can show that we are not powerless against syphilis, but can prevent serious injury to the organism by appropriate and in this sense prophylactic treatment. Here we do not hesitate to say that syphilis is curable in the greater number of cases, and that our prophylactic measures must be directed towards preventing serious and dangerous results.

A large number of statistics and our own observations prove that the best protection against the severe after-consequences of syphilis is to be found in an energetic and long continued treatment of the disease. But treatment should not be begun until the diagnosis of syphilis has been absolutely established. On the other hand, I should recommend that, with but few exceptions, no preventive treatment for syphilis should be begun, because I have seen no advantages result therefrom ; but on the contrary, disadvantages. Too often the diagnosis of syphilis is made because of the presence of an ulcer which seems to the physician to be typical. If the further course shows this diagnosis to have been incorrect, the patient is constantly tormented by the fear that he is infected, and in this way a large number of cases of syphiliphobia arise. Just as often the physician makes the diagnosis of syphilis from the presence of the chancre, and possibly some slight swelling of the glands. Specific treatment is recommended, and after one course of treatment no other symptoms of syphilis appear. Then the physician doubts whether he made a correct diagnosis, or the patient thinks that as he no longer has any symptoms, he need undergo no further course of treatment. Such cases are daily met with in practice, and this kind of treatment is responsible for a great deal of

mischief. Instead of giving many such experiences, I will mention one which seems to me of great significance. A merchant, thirty-four years of age, became infected in the year 1893. By the advice of the doctor who treated him, he underwent one course of treatment by inunction before any roseola appeared. When later no further symptoms appeared, both doctor and patient became uncertain whether he had had syphilis. Careful inquiry showed that now and again small fissures appeared on the tongue and lips. The patient ascribed these to much smoking, and they disappeared on being painted with tincture of myrrh for a few days. The patient thought no more about his former illness and married five years after the infection had taken place, and naturally without asking a doctor. Shortly after their marriage his wife began to ail, lost flesh, became pale and had constant headaches. Because of these symptoms, Weir-Mitchell treatment was tried but without success. When, after taking antipyrin, a rash appeared on her, the physician treating the case took it to be a drug-rash. When I was called in I was able to diagnose syphilis by the extensive maculo-papular rash, a marked swelling of the left sterno-clavicular joint, and a periostitis of the cranial bones. Specific treatment brought about the desired improvement in the symptoms.

What does the observation teach? First, that it is the duty of every physician to tell his patient that the prognosis for syphilis is good only when the disease has been treated energetically and for a sufficient time. And in this connection, the so-called preventive treatment of syphilis seems to me to be of little value, because it frequently gives the patient a sense of false security, as he thinks he is free from disease, whereas the symptoms have only been postponed by the early course of treatment. But it is otherwise and much easier when the typical roseola has been diagnosed. Then there can be no doubt about the certain presence of syphilitic infection. The physician can now with a feeling of perfect certainty require the patient to be treated continuously for two years. I believe that if this general treatment were postponed until the appearance of the

roseola, matters would thereby be made much easier for the physician and for the patient. That this delay does no harm to the patient but is rather of benefit is proved by the opinion of many specialists—Hebra, Sigmund, and Zeissl. The above history of a case might give one the opinion, that in this case infection of syphilis occurred after five years in spite of a course of syphilitic treatment, although as a rule it is stated that the infectiousness of syphilis is lost after three or four years. This statement holds good for the majority of cases, but only if an energetic specific treatment has been carried out for two years. In the case described above, there had only been one course of treatment and the infectivity had not been removed. Thus we cannot regard this preventive treatment as really prophylactic, and we are again forced to the conclusion that the best prophylaxis for a later, favourable course in syphilis is firstly, a correct and absolutely certain diagnosis and secondly thorough treatment for two years. This is not the place in which to give further details about the method of treatment; but I may sum it up here in a few sentences.

1. General treatment should not be begun until the roseola appears.

2. The patient must be treated for two years. He should undergo four courses of treatment during the period, one every six months. The first and last courses of treatment are best given in the form of inunctions; for the second and third, for the convenience of the patient, one may give injections. During the intervals symptoms of syphilis should be treated locally, and the glands reduced in size by local applications of blue ointment. The glands should no longer be palpable at the end of the two years' treatment.

3. After this two years' course of treatment with courses of iodide treatment in the intervals, the patient should wait another two years. During this time, we need only attend to the general bodily health. If he has remained free from symptoms, I permit him to marry four years after the infection occurred, and only ask that shortly before marrying he shall undergo one course of treatment as a prophylactic.

4. During the period of treatment, the patient should abstain from all sexual intercourse. Indeed, the physician should constantly remind him that he is a source of infection. Many cases of extra-genital syphilis might be avoided if only the patient were told the very first time he comes for treatment, that every lesion, however small and superficial, may convey syphilis to a healthy individual if it comes into contact with an abrasion however trivial. Great neglect is shown in this respect, and physicians do not always sufficiently draw the patient's attention to the great danger of infection. When the patient has carefully followed out all our directions, and at the end of the treatment asks us whether he is cured, we are in my opinion perfectly justified in answering him in the affirmative. We can tell him that experience proves that the best prophylaxis against subsequent consequences of syphilis consists in thorough treatment of the disease, and that in the great majority of cases no late symptoms appear. We need not be too pessimistic towards the patient. We may permit him to marry after the treatment has been adequately carried out, though making clear to him that we cannot absolutely guarantee his future health.

Naturally, it is possible in some of the cases that the disease has not died out even after four years. Those are however exceptional cases and in no way justify the great difficulty often put in the way of the patient's marrying.

My experience is that no patient who has carefully carried out all these therapeutic measures, and to whom after due deliberation I have given permission to marry, has conveyed syphilis to his wife or children. The patient himself has certainly now and again in later life developed a gumma. When they appear on the skin or the bones, we have an excellent specific means at hand of ridding the patient of his trouble. This possible later appearance of a gumma in the father of a family, who had before been infected with syphilis, is not, I consider, so great a misfortune that one ought to forbid him marrying if he wishes to marry. My experience is that the gumma is not infectious, and

we need only to recognize it early in order to cure it. Obviously when I say the gumma is not infectious, I am speaking from personal experience. There is at present no scientific, incontrovertible proof for this view. But if at some future time, we should obtain certain proof that the gumma may still cause infection, then we should have to accept the fact and act accordingly.

If in considering prophylaxis before marriage we put aside the consideration of the man, we have naturally to use every possible means to prevent the conveyance of syphilis to the woman and the children. Experience teaches that the wife runs less chance of becoming infected in marriage through syphilis than through the after consequences of gonorrhoea, omitting of course cases when the husband has become infected after marriage. We find that the wives of men who were infected some four years before marriage, and who underwent a thorough treatment, seldom become infected. Occasionally however, although rarely, in spite of all prophylactic measures, abortion occurs, and in such cases prophylaxis must be energetically pursued. If in such a marriage abortion occurs it is generally ascribed by the wife or relatives to a purely accidental cause. It may be the woman has had a fright, or some slight accident—all possible innocent events are searched for to which the abortion can be attributed. But when the physician knows that the husband had been infected, conjectures are possible as to the connection between the infection and the abortion. In these cases, prophylaxis may be most valuable. It is the duty of every physician to prove to the husband and to make it evident to him that syphilitic infection has been the cause of the abortion. Both husband and wife should then undergo thorough specific treatment. It is obvious that they will often not submit to general treatment until it has been proved to them that they are suffering from syphilis. And this proof can be found in Wegner's osteo-chondritis of the epiphyses, which it is possible to demonstrate macroscopically. Its presence is incontestable evidence that the foetus suffered from hereditary syphilis.

This sign may be found in the foetus, even when no other sign of syphilis is seen. General treatment commenced at once generally ensures that the next child is born alive. When this takes place, the question arises what prophylactic treatment should be followed in the child. It is evident that so far as the father and mother are concerned, nothing can be done for the child, because they are both already infected; for the exceptions to the law of Colles may here be disregarded. But greater significance attaches to the question as to how the child is to be fed, and whether it shall have a wet-nurse. My answer to the latter question is a most decided negative, because it is very easy for the wet-nurse to become infected. Moreover there is no need at the present time to recommend the employment of a wet-nurse. When the mother cannot suckle the child, excellent results can be obtained if the directions of Soxleth as regards feeding infants are conscientiously carried out.

II. The Special Prophylaxis of the Soft Chancre

This is of much less significance. In the first place, the soft chancre is much less often met with than the syphilitic primary sore; and secondly, it always remains a local affection which may at most be accompanied by a suppuration of the lymphatic glands, a bubo. There is no doubt that if prostitutes were carefully supervised, soft chancre would be a rare occurrence.

We should accustom ourselves to look with doubt upon every sore, however much the clinical symptoms may point to a soft chancre. If we wait to see whether, even with multiple sores, constitutional signs of syphilis appear later, we shall be surprised to see how rare the soft chancre is, compared with the syphilitic primary sore. Neither do I think that we can speak of mixed chancres in these cases, thereby implying that at the moment of infection the individual became impregnated with the virus both of the soft and of the hard chancre. We must be clear about the fact that the present purely clinical signs of distinction between soft and hard chancre do not always suffice

to enable us to establish a certain prognosis after the first examination. Not till we know these infectious agents better will it be possible at once to distinguish between soft and hard chancre. In addition to waiting, there remains "confrontation." I was quite surprised how often in such cases, with the most careful examination of the woman, I met with no trace of a soft chancre but only with the typical symptoms of syphilis. It shows how unsafe is a diagnosis depending on the typical signs of soft chancre.

There is very great probability that we already know the infectious agent, Ducrey and Unna's streptobacillus, and thus may hope that shortly too we shall discover a prophylactic against this organism. Meanwhile, we can only make the same recommendations as for syphilis. In every case the penis should be thoroughly disinfected with soap and water after coitus. Permanganate of potash is best for the purpose, a few crystals being dissolved in a bowl of water. Carbolic acid and corrosive sublimate, which are unfortunately still much used, are quite unsuitable, because they very readily produce erosions which often stimulate venereal ulceration.

I would point out that in individuals with a very short frenum, the soft sore is often situated at that spot. In such patients, fissures of the frenum occur more easily in coitus, and the streptobacilli are then probably able to invade the tissues. I always therefore advise patients who have a short frenum to have it incised.

When a soft chancre has formed, prophylactic therapy is very successful. Following Neisser's suggestion we cauterize the chancre and all its depressions with liquified carbolic acid. Often it is only necessary to do it once, in other cases it needs to be repeated every three or four days till a good granulating surface is formed. Since treating these sores in this way I have seen fewer buboes than formerly among the working classes. I then apply iodoform as the disinfectant which is surest and permits healing most quickly, and for which I know of no real substitute.

III. The Special Prophylaxis of Gonorrhoea

It is only since Nöggerath pointed them out, that we have thoroughly understood the harmful results which gonorrhoea may cause not only in the man but also in the woman. Previous to that, it was always said that gonorrhoea was an innocent affection from which many men suffered in their bachelor days but which passed off without leaving any results. Even if Nöggerath overstated the matter somewhat, nevertheless he gave the impulse to more exact inquiries into the injurious effects which gonorrhoea in the man sometimes and even often produces upon the health of the woman. Gonorrhoea is, as Neisser says, a very common disease in so-called civilized countries, probably the commonest except measles, and it is certain that thousands and tens of thousands of men and women in every civilized country are ill and permanently affected in health and ability to work, who owe their ill health to gonorrhoea. We must therefore support all efforts, which aim at the prophylaxis of gonorrhoea and which combat a disease still unfortunately too often regarded as a mild affection.

When Crédé, by dropping a two per cent. solution of nitrate of silver into the eyes of newborn infants, almost entirely succeeded in preventing ophthalmia neonatorum, the thought occurred that its use might be extended to gonorrhoea in man. The first attempts of Haussmann brought discredit upon the method because the injection of a two per cent. solution of silver nitrate into the urethra, which he recommended often gave rise to purulent urethritis. Blokusewski recommended that after a suspicious coitus two drops of a two per cent. solution of silver nitrate should be dropped into the urinary meatus and a third drop be allowed to run outside over the frenum. The reason for the latter is the following: Not seldom, patients tell us that they did not notice any gonorrhoea after the ordinary incubation period of two, three or four days, but that the gonorrhoeal discharge appeared after a week or sometimes even later. Though at times certainly

this late appearance of discharge is explained by lack of observation, yet it cannot be denied that this late incubation sometimes occurs. Blokusewski thought that the explanation might be that the gonococci in these cases have not entered the urethra but have lodged outside on the frenum and only later pass into the urethra. To prevent such an invasion, a third drop was to be put on the frenum.

The further directions proposed by Blokusewski have this for their object—that as soon as possible, within a quarter of an hour after coitus, two or three drops of a two per cent. solution of silver nitrate should be dropped into the fossa navicularis after previous urination. After a quarter of a minute it may be washed away with water. It is important that urination should be complete, and if the urethral orifice is closed for a time by laying the finger upon it (not pressing the sides together) the secretion in it will be washed out. If urination is not possible, the secretion in the fossa navicularis should be removed by washing with water. If the solution is not dropped in till later or is forgotten, a longer application (half a minute) is useful. As a rule, protection is afforded even after a few hours. In order that the application may be properly applied, Blokusewski constructed a portable dropping glass which can easily be carried in the pocket. The question whether with this prophylactic it is possible to prevent gonorrhoea is one difficult to answer. It is certain that the method can do the patient no injury whatever. For most patients say, that after dropping the silver nitrate solution into the urethra they feel a slight burning for a few minutes at most, which soon passes off. One cannot say with absolute certainty whether all patients can bear this prophylactic. It is possible that the silver nitrate might set up irritation in a few individuals. In one case observed by E. R. W. Frank a urethral discharge associated with pain followed the adoption of Blokusewski's method.

Although I have not myself met with any similar case, yet it needs to be considered even though it be exceptional. Frank therefore made trials with protargol, which Neisser has recommended as an excellent prophylactic

in gonorrhoea. His results definitely proved that the action of a twenty per cent. solution of protargol in glycerine for five seconds shortly after coitus afforded absolute protection against gonorrhoeal infection. This method, compared with Blokusewski's silver nitrate method, has the advantage of being quite free from irritation, and as Frank rightly points out, the protargol method has the further advantage that it can be carried out directly after coitus, without any previous manipulation. The application is made by means of a small, portable drop bottle. As a prophylactic, two or three drops of the solution should be passed into the orifice after coitus, and if very special precaution is to be taken, they may also be used before coitus, though it is not absolutely necessary. Another drop should be put on the frenum in order to render innocuous any gonococci lodged there. Men with a tight prepuce which cannot be retracted would do well to wash out the preputial sac with protargol solution. Sometimes, according to the observations of Welander, a mucous discharge may appear twelve to twenty-four hours after the use of the protargol, but it is not associated with the slightest subjective trouble and disappears after twelve to twenty-four hours without any treatment.

One may probably say to-day that a twenty per cent. protargol solution is to some extent a prophylactic against gonorrhoea.

Even if gonorrhoea cannot in every case be prevented by this prophylactic, yet it is of great value if it is effectual as a preventive in many cases. It is the duty I think of physicians, if asked, to make this prophylactic known. Prostitutes should be instructed to wash out the vagina with protargol solution every time before coitus.

Great stress should be laid on the prevention of gonorrhoea, and all endeavours must be directed to this end, because when gonorrhoea is once established we have no such sure means of treatment and often months elapse before any real result follows.

The abortive treatment of gonorrhoea is less useful. In many cases, certainly, protargol is of great service, but

it is not an absolute specific. In a large number of cases I have found that patients who came to me very early with subjective burning and painful sensations in the urethral mucous membrane after a suspicious coitus, and in whom although there were no objective signs of gonorrhoea, I used protargol, were completely cured. Such patients who observe themselves very carefully notice a burning sensation in the urethra six to twenty-four hours after coitus, they have the feeling as if the urethral mucous membrane were somewhat swollen and congested, and they notice some little turbidity in the urine, not any pus but small flakes. In these cases, in spite of the use of protargol, I have found that a drop of pus issues from the urethra on the second or third day after the coitus, in which gonococci can be plainly proved to exist. Naturally it sometimes happens that I make a mistake and that in two or three days no gonococci are to be found. In that case I do not count the patient among the gonorrhoeal cases, and acknowledge that I was mistaken in my diagnosis of gonorrhoea. Certainly I have not done the patient any harm by my treatment. On the other hand, in those cases where gonococci are found after two or three days in spite of the protargol, the result has generally been excellent. At the Congress of the German Dermatological Society in 1898, I reported the favourable results I had had with this early treatment of gonorrhoea, and I can now add to these results. In some fifty cases which were carefully observed, not only had the gonococci disappeared after four or five days, but the gonorrhoea was cured in three or four weeks at latest. But in a few cases, the gonococci did not disappear till much later, and the cure of the gonorrhoea was much delayed thereby. Perhaps the protargol treatment had not been commenced early enough in these cases. My impression is that protargol is followed by this good result only when used at the very earliest stage. If gonorrhoea has existed already for a few days, I have often enough observed that the result of protargol treatment is very slight. It would seem that protargol is of value only in cases which come very early for treatment.

I then always combine it with an astringent, and order

in addition to the protargol solution (1 in 200), Ricord's solution (zinc sulphate and lead acetate, 1 of each in 200 of water).

The protargol is used morning and evening for the prolonged injections which Neisser recommends, and Ricord's solution twice during the course of the day. After having micturated, the patient should syringe out the urethra by means of a syringe containing ten cubic centimetres of lukewarm water, should then inject the protargol, lie down in bed and hold the solution in the urethra for half an hour if possible. Even very busy patients can spare that amount of time morning and evening, while during the daytime I recommend that Ricord's solution should be kept in the urethra ouly for five to ten minutes. Equally good or even better results were obtained by B. Goldberg with Janet's injections of potassium permanganate. He considers this treatment a sure method for arresting commencing gonorrhoea.

It must then be our endeavour to accustom patients to come as early as possible to the physician, in order that they may at once be treated in this energetic way. My experience in this respect is precisely the same as in the treatment of the soft chancre. Many patients already know that as soon as a soft sore appears, touching it with carbolic acid is useful and may prevent the formation of a bubo. And equally good results follow, when patients come for treatment very early for supposed gonorrhoea.

Here and in other venereal diseases, this knowledge should be more widely spread among the public. It is sad to see in a large town, how many not only of the rich, but also of the poor, carry their hardly-earned money to the quack to be treated by him for venereal disease. The great benefits of the German sick-fund law, by which patients are able to have free treatment, though not unfortunately in all of them sick pay when ill with venereal disease, are still far too little valued by members of the fund. We must therefore strive to get sick pay from all these funds for their members which are unable to work owing to

venereal disease. Moreover, all classes of people should be taught the nature and prophylaxis of venereal disease.

We are much indebted to Zadek and Blaschko for a few clear, brief statements for this purpose. It seems to me, however, that the advice given by them for the prevention of venereal disease is still too elaborate, and therefore not read so much as it should be. I would summarize the teaching as follows :—

1. Illicit sexual intercourse with registered or unregistered prostitutes is seldom free from danger. Most of these persons, or almost all, suffer from gonorrhoea or syphilis, and there is great probability that men who visit them will become infected with venereal disease.

2. If one exposes oneself to the danger of this intercourse it is recommended to smear the penis with ointment and more especially to use a condom, and to wash the parts thoroughly after sexual intercourse.

3. Directly any one notices the very slightest thing wrong with himself, he should at once consult a physician who can nowadays do very much to cure the disease if it is recognized early. Quacks of all kinds often do much harm, and should be carefully avoided.

More detailed advice and information about the duration of infection and the method of treatment, say of syphilis, should be given personally by the physician, and he can in this way do much good by kind, yet energetic and impressive teaching. But to print all the advice and instruction, and put it into the hands of the patient, seems to me not advisable, because most patients do not read long statements or pay no attention to them, but are very receptive of verbal advice.

B. GENERAL PROPHYLAXIS OF DISEASE OF THE SKIN

Skin diseases are of far less importance in regard to prophylaxis. The reason for this is that we know too little about the aetiology of most skin diseases. Very few have been sufficiently investigated from the aetiological standpoint to enable us to adopt a prophylaxis based thereupon.

The skin, the most important organ for regulation of

metabolism, naturally requires very great care. In this respect ablutions and baths are valued far too little from the prophylactic standpoint. In early childhood it is often carried to extreme, and many children in their first year of life receive a full bath daily, and in addition are washed all over in the morning and evening, which is almost equivalent to three baths a day; but this is strikingly changed in later life. There are small towns where there is no convenience for baths even for those who would like them. An enquiry made by Lassar shows there is one institute for warm baths to every 3,000 persons instead of one to thirty, as should be the case.

Towns are much more favourably circumstanced than the country. One cannot sufficiently express one's astonishment that in two-thirds of the kingdom of Prussia the people have no public warm-water bathing institute, and that of 338 Prussian districts, 96, or thirty per cent. are without bathing institutes. According to this calculation, in about two-thirds of the German Empire, some five million people, or about one-sixth at least of the inhabitants, are unable to have a warm bath for purposes of cleanliness. Lassar's efforts therefore to establish numerous cheap baths for the people deserve the widest and completest support.

The money expended for such prophylactic purposes would surely bear much fruit. The shower baths for the people, first introduced by Lassar, in which everyone can get a warm or cold shower bath, with soap and towel, for a penny or three halfpence, ought to be established not only in many public places, but also in schools and factories. These would be of the greatest service, because most people feel a great desire for cleanliness, but have no opportunity to satisfy it.

In addition to water, great value attaches also to the soap. By it the fat on the surface of the skin is emulsified, and then only can one speak of real cleanliness. With a normal skin no great stress need be placed upon the kind of soap used. All soaps are indeed combinations of fatty acids with alkalies. The alkali present in excess

dissolves the superficial horny layer and cleanses the skin as it helps to remove mechanically the uppermost horny cells which may be regarded as almost dead.

But if there is any slight sensitiveness of the skin, an irritation or a real inflammation, the use of alkaline soaps as generally sold must be forbidden, and a neutral soap be used. The centrifugalized soaps should then alone be used. I recommend these for very susceptible, delicate skins, for instance in women and children, and also when there is a tendency to inflammatory dermatoses and after these have been cured. But I have never seen any very striking good results follow from the use of medicated soaps. It is obvious that ointments prescribed by the physician, with ingredients in definite proportion, have great advantages over these soaps which the manufacturer supplies but which cannot be controlled by the physician, as regards the proportion in which the ingredients are present.

Ointments and fats are far too little valued as prophylactics for the normal skin. The custom of the old Greeks and Romans of anointing their bodies after bathing would be very good for many people, especially children and women, but also workmen. Many cases of intertriginous and trade eczema might be prevented if this custom were again introduced. Indeed, it is possible by a slight addition to the fats, to make these ointments antiseptic. This would be of the greatest use in preventing those forms of dermatosis, which we know to be parasitic. The laborious investigations of E. Breslauer have proved that ointments which contain soluble disinfectants, possess bactericidal properties. Vaseline, fat or oil should not in these cases be used as the basis, but only lanolin and unguentum leniens. For an antiseptic effect, watery ointments should be recommended; but for inflammatory conditions and for anointing the body and preventing roughness of the skin, ointments made of vaseline, fat or oil should be used.

Special Prophylaxis of Skin Diseases

There is no need, I think, in the present stage of our knowledge of prophylaxis to mention each dermatosis separately. With many, we should be obliged to mention again and again our total lack of knowledge. But a few groups may be singled out the aetiology of which we know and the prophylaxis of which is therefore also known.

In addition to the group of trade-eczemas, we shall consider parasitic and endemic dermatoses.

1. TRADE-ECZEMA

Trade-eczema is the commonest dermatosis which we meet with in hospitals. In some trades a large number of the workmen are affected as a result of their work, after having been engaged at it for a longer or shorter time. Generally the cause is some substance which acts upon the skin, producing an artificial dermatitis which is catarrhal in character.

I have been able to show from my polyclinic that among 940 cases of Eczema, 499 were cases of trade-eczema. In locksmiths, tinsmiths, and blacksmiths we often see impetiginous eczema on the hands and forearms, and on the face and ears. The metal dust on the skin, and the irritation of acids which are used, more especially in soldering, are the causes of it, in addition to the action of the open fire. Eczema rimosum is common among smiths and locksmiths, because they have to handle heavy tools. Painter's eczema attacks the hands and forearms. Here the cause seems to be the poisonous nature and irritating properties of the colours. Among cabinet-makers, furniture polishers and varnishers, the injurious agent is the furniture polish. The irritating substances in these are probably the methylated spirit, rancid oil, prepared chalk, pumice stone, sulphuric acid, and the so-called Vienna polishing chalk. Eczema in aniline workers is to be attributed to the chemicals used, the eczema of masons to injury by the cement and lime and to working out of doors.

We do not know what are the conditions which determine whether in any individual case the workman will or will not get eczema. Of two workmen apparently of similar constitution and similar skin, the one does his work for years without becoming affected, while the other gets eczema after a short time, and a third begins to be ill after several years. It is the same with drug-rashes. Some individuals will bear a drug well for years, while in others it brings out an eruption at once. We are forced, in trying to explain the appearance of this eczema, to take refuge in the word predisposition. We must believe that some workmen have an idiosyncrasy towards certain chemical influences.

The word "delicate skin" really means not much more than that. For the eczema of the surgeon, which is also a trade-eczema, the prophylactic measure we adopt is for the operator to rub his hands thoroughly with fat every night, but there are not many opportunities of getting workmen to do this. In the first place, the patients come to us only when they are already ill; and in the second place, in their unfavourable social position they are not able to carry out directions and grease their hands every night. We are therefore mostly confronted with the eczema, and the question arises, what have we then to do.

It is certain that in many occupations the observation of hygienic measures, and when possible the wearing of elastic gloves, will sometimes prevent eczema. We know that in trades in which turpentine is the injurious agent the better kinds of turpentine will sometimes prevent the development of eczema. This is especially the case with cabinet-makers. But in most workshops the French turpentine, which is less irritating, cannot be used because it is too dear. Besides turpentine, other injurious substances of a chemical nature, as stated above, are harmful in cabinet-making. The spirit is methylated for use in this trade, and the question is often asked whether the eczema among cabinet-makers is due to this addition. I have made many enquiries, observations and experiments in regard to this, and am not convinced that the methylated spirit is the real cause of the cabinet-maker's eczema. I

believe that the substances named above are the noxious agents. From this it is obvious how difficult it is to suggest any measure to prevent this trade-eczema.

It would certainly be an advantage if hot water and a neutral soap were placed more often at the service of workmen while they are at their work. Moreover, those workmen who suffer permanently from eczema should be supplied with a fatty mixture which they could always rub into their hands after work. The English preparation of glycerine and honey-jelly is especially to be recommended, because, after rubbing a small quantity of this on the hands, no fatty residue is left on the skin as is the case after using vaseline or glycerine, and the workman can resume his work directly afterwards. Thus, at least in some cases, prophylaxis is of value, and many an eczema can be prevented from recurring. But there remain a number of cases of eczema in which it always re-appears year by year after the patient has been for a longer or shorter time at work. We can generally obtain good results by treatment, but when the workman resumes his work the eczema breaks out afresh. In these cases, after prolonged observation and treatment, we are obliged to advise the workman to give up his work and take some other employment; this is very regrettable, because it is often very difficult for a workman who is skilled at his trade to get his living in another way. There is, however, no alternative left us.

Naturally, this applies to a few cases only. In most we can, by treatment, obtain very good results. In addition to treatment by acetate of aluminium, pastes of zinc and tar are very useful. Even after the eczema is cured, we advise the workmen to continue prophylactic treatment for months longer, and we then order a simple ointment to be applied every night. Guided by these principles we can obtain very satisfactory results.

K. Herxheimer has recently described a special form of trade-disease. He observed a chlorine-acne. The cause of the severe acne was free chlorine. The patient worked in a place where caustic potash was made from potassium

chloride by electrolytic action. The free chlorine probably penetrated the wall and was breathed by the workman. Acne resulted through the breathing of the gas and its elimination by the sebaceous glands. It ought not to be difficult to prevent this by better protective precautions.

Compared with trade-eczemas, other eczemas which we know to be caused by irritating substances are far less important. In eczema of the lips one should bear in mind that ordinary mouth washes and tooth powders—for instance, odol—contain ethereal oils, which may exercise a permanent injury on the lips and neighbouring parts coming into contact with it. Such chronic peri-oral eczema, often lasting a long time and constantly recurring, is very obstinate to treatment, but often heals rapidly when the injurious substance is omitted. The Röntgen ray dermatitis, which has been recently observed, may be avoided by a little care if the patient is not exposed to the rays for too long a period at a time, and the focus-tube is held at the right distance from the skin. These injuries were more frequent when the X-rays were first discovered, and with the care now observed are less frequent. In the same way the injurious effects produced by electric light may be prevented by care.

It is less easy to prevent the injurious effects produced by staying too long in the sun. Possibly we can prevent this eczema caloricum which attacks so many people by following Unna's suggestion, of protecting the face and hands with tincture or collodion of turmeric against the blue and violet rays. The parts protected with the turmeric remain pale.

In contrast with this, cold plays a much less important part when considered from the stand-point of prophylaxis. At least those injurious effects which appear on the hands and feet, chapped lips or chilblains, may often be prevented by adequately protecting the parts against cold. We should also remember that general weakness and marked chlorosis favour the development of chilblains. For chapped hands it is sufficient to apply glycerine honey-

jelly every night for some time, while a surprising and comparatively rapid improvement of chilblains is brought about by chlorinated lime ointment (1 in 10), as recommended by Binz. The general health should also receive attention.

Balanoposthitis or herpes progenitalis, which recurs in many individuals, will often readily yield to drying powders (for example, boric acid or dermatol). Many men in whom the inner surface of the prepuce is very sensitive, often get recurrent attacks because they wash this part, which is very similar to a mucous membrane, too roughly with soap and water. One should steer between overcleaning and total neglect of hygiene, because conversely, in many individuals who have much smegma, herpes progenitalis or balanoposthitis, may arise from decomposition of secretion. In every case, probably, if there is much sensitiveness of these parts, it is well, after having washed, to apply boric acid vaseline.

Besides the eczemas above-mentioned, intertriginous eczema, especially in the inguinal fold, occurs often in children and also in adults. It may be a source of trouble to the patient for months, tends always to recur, and not rarely the eczema may spread thence over the whole body. Much can here be done by way of prophylaxis. I have already hinted above that too much washing and bathing of children may often be the cause of such an eczema. We should see that the parts are well powdered or smeared with an unirritating ointment—for example, a five per cent. boric acid ointment. In adults excessive perspiration at these places gives occasion for the first appearance of eczema intertrigo. Therefore, it is apt to recur after it has been cured if the exciting cause still remains. Not only in the inguinal folds, but also in other parts of the body, as the axillae, eczema may be caused by excessive perspiration, and also deep-seated suppuration in the sweat glands. Similarly, rhagades may develop on the feet as the result of excessive perspiration, and be a source of great trouble to the patient. The only way of preventing recurrence of these affections is to remove the excessive perspiration of

these parts. The objection still met with among the laity against checking perspiration, because of a fear that it will give rise to internal troubles, is beginning to disappear. All those fables that checking the perspiration will drive the disease in may be energetically contradicted. The best prophylactic against intertriginous eczema, which at the same time cures the hyperidrosis, is the liquor antihydrorrhœicus of Brandau. This liquid is corrosive and should be diluted according to the part of the body for which it is used. For the axillae and inguinal folds it should be diluted with an equal quantity of water, and pieces of linen, dipped in the solution, should be laid upon the diseased parts for a few minutes. Boric acid vaseline should be applied directly afterwards, and the treatment should be repeated about twice a week. Even in severe cases improvement soon sets in. If there should be a recurrence the same method of treatment is again applied. In some cases we can, instead of this, paint the part with formalin or dust it with tannoform.

There is much greater difficulty in preventing the formation of callosities, which develop not seldom on the hands and feet of workmen and of others. In those cases where the individual has to work hard with his hands and such hyperkeratosis develops, the aetiological factor is obvious. But there are a number of patients who are engaged in writing or are occupied as salesmen in shops, and who yet suffer from severe forms of tylosis of the hands, and often also of the feet. These are a source of much trouble, both to the patient and to the physician, and in spite of all we can do we can often not cure it, or it frequently recurs.

In slight cases we can apply some form of fat nightly, or ten per cent. salicyl soap plaster; in severer cases a thirty to fifty per cent. salicylic acid plaster often gives good results. This will not always cure severe cases. Then sometimes I find that prolonged use of the liquor antihydrorrhœicus of Brandau, or painting daily with liquor carbonis detergens causes improvement. The result is however always a little disappointing; here is an opportunity for

chemistry to help us with some new, energetic, keratolytic substance.

Lastly, we must mention local argyria and siderosis. With silversmiths very small particles of silver get into the skin, are there oxidized, and blacken the elastic fibres. In a similar way, in millstone-makers and in millers and stonemasons, small round brownish-blue spots develop on the extensor surface of the hands and fore-arms, being caused by particles of steel which penetrate the cutis. The only prophylactic would be efficient protection of the hands against injury while at work by the use of gloves or finger stalls. The workmen would of course object because they would not be able to do their work so well.

2. PARASITIC DERMATOSES.

Next to eczema, prophylaxis is most important in the case of those skin-affections which can be conveyed from one individual to another by contagion.

In these cases the aetiological factor gives us the clue to the preventive treatment. Otherwise we know of no specific prophylactics against the various dermatoses, and can only apply the principles of general hygiene.

(*a*) Vegetable Parasites.

Among skin diseases produced by vegetable parasites, the greatest importance prophylactically attaches to tinea barbae. It is very common at the present day, and sycosis is frequently met with in large towns, both in private and in hospital practice. We know that it can be avoided by cleanliness and strict aseptic precautions, and it is therefore obvious how important in this respect prophylaxis may be. Tinea barbae is mainly spread by the barber, and the other sources of infection are insignificant in comparison with this. To prevent it, a barber should never shave anyone in his shop who is evidently suffering from tinea barbae, and he has the right to refuse to shave anyone whom he suspects to have this disease, but he can of course shave him at home if he observe the following pre-

cautions. It is necessary that he should have his own razor, as indeed should every one who goes to a barber, and his own shaving brush and towel. I consider it best that each should apply the soap himself, so that the barber has only to apply the razor, previously put into hot water, and to shave. After the shaving, the individual should himself wash his face in the washing basin. Powders should be avoided in barbers' shops, because infection may readily be conveyed by the powder puff. Or, a piece of wool only should be used, dipped into the powder and thrown away directly after use.

Infection with tinea barbae is especially apt to occur with barbers who have a large clientèle, and these precautionary measures would considerably lighten the barber's work and the individual would be protected against infection. It would also be of value if every barber were obliged to disinfect his hands in a bowl of a solution of corrosive sublimate (1 in 1000). For, one can see in the barber's shop how little attention barbers pay to their own hands. They go from one person to another and shave, without washing or disinfecting their hands. They merely dry their hands on a towel. In this way infection can easily be conveyed. I have known a case where the patient had the same barber come to his house to shave him with his own razor for seven years, and even then one day he caught tinea barbae. Therefore I advise that the barber should thoroughly disinfect his hands in a bowl of corrosive sublimate lotion. I believe that even a very busy barber could find time enough to do this, whether at the house of his client or in the barber's shop. It is obvious also that his linen and his nails should also be clean. The only alternative which the public have when the barbers will not observe these precautions, is to shave themselves.

Meantime we should endeavour more and more to make these prophylactic measures as widely known as possible, because tinea barbae is a very troublesome skin-affection. It may, after it has existed for a longer or shorter time, lead to a very serious result, namely, sycosis parasitica. When this happens it will take long to cure. Therefore at the very first appearance of the disease, active prophylactic

treatment should be at once commenced. The earlier and more thoroughly the fungus is removed, the more likely is it that the development of the severer parasitic sycosis will be prevented. As soon as the disease has been diagnosed, and this is easy both clinically and microscopically, it should be painted with five per cent. chrysarobin-traumaticin; painting the part twice or thrice during a period of three or four days is often enough to effect a cure. If the patient shaves during this period, I order the rest of the face to have corrosive sublimate solution applied to it by means of a piece of wool dipped in the solution, before and after shaving. In this way it is generally possible to prevent the development of sycosis.

Sycosis non-parasitica has nothing to do with this affection. Its aetiology is still unknown. Some have described cocci and bacilli as the exciting cause, but no proof has yet been forthcoming of this; and the question arises whether these may not have appeared secondarily to the morbid process. One often finds that people with thick, bristly hair with a thick growth of beard get this form of sycosis more easily than people with soft, fine hair. Our endeavour must be to commence thorough prophylactic treatment at the very first appearance of sycosis, and when a cure has been effected, we must forbid the growing of a beard for a long time, because sycosis appears anew when the patient allows the beard to grow again. Sometimes he ought not to grow a beard till several years have elapsed, and even then recurrence is not excluded. In sycosis non-parasitica of the upper lip we should not omit to treat the chronic rhinitis, which is mostly associated with it.

Tinea cincinata affords a very favourable field for prophylactic measures. We know that this affection develops in many people who wear next their skin woollen underclothing which has lain for a long time in the dust, for example, in a shop or cupboard. The fungus does not appear to effect a lodgment unless the patient perspires a great deal; probably the fungus invades the macerated epidermis. We should, therefore, as a rule, advise such people not to wear newly-bought things until they have been

washed. The affection is a comparatively slight one and can easily be cured.

Tinea on the scalp is, in Germany at least, much less important. We see it very seldom, and it is interesting to note how the body at different periods becomes less suited for the lodgment of trichophyton. Thus tinea tonsurans occurs only in children, while adults may have fungi on other parts of the body without the head being affected. In other countries, for example, France and America, tinea is so common that an entire school has sometimes to be closed. The physician's chief aim here must be to prevent the infected child from coming into contact with the rest of the children, and to cure the disease quickly with chrysarobin or with antiseptics.

Favus is of less importance as regards prophylaxis. For the danger of infection is far less than with tinea tonsurans. Sometimes one sees a child in a family affected for years with favus, yet none of the others become infected by it. Our aim should be to treat the disease energetically as soon as it is diagnosed, to prevent any danger of infection.

General rules of cleanliness and care on the part of the parents or attendants are sufficient for this. The general rules of hygiene have accomplished so much. that in many countries favus has almost died out. In Germany we seldom see a case of favus, and when we do chance to see one, it has generally come from other countries. Here again an early diagnosis is required in order to get good results from energetic treatment and to prevent its further spread.

Pityriasis versicolor, too, has no great prophylactic significance. Even though it has been proved that this affection is caused by microsporon furfur, and it has been experimentally conveyed from one individual to another, yet this does not occur in ordinary life. If a little attention is paid to the skin, there need be no fear of infection either from this disease or from erythrasma or eczema marginatum. The patient should be quickly cured of his trouble, and there will be little probability of his affection being conveyed to other members of the family.

(*b*) Animal Parasites

The prophylaxis of dermatoses produced by animal parasites is comparatively simple.

Acarus scabiei, the exciting cause of scabies can only live in the skin of man. Protection against it is fairly easy. One need only avoid all intimate contact (for example, sleeping together) with one who has scabies and one will escape infection. When the patient is warm in bed, the acarus comes to the surface of the skin and so passes from its original host to the skin of another. One does not get scabies by merely touching one suffering from it, for example in shaking hands. The question is often considered, whether one can get scabies by wearing the clothes of one suffering from scabies. As a rule, the question may be answered in the negative. Nevertheless there is the possibility that the eggs may lie in the clothes of one who has scabies, develop there, and be conveyed then to a healthy individual. It will probably however be a rare occurrence. Therefore, I consider the disinfection of the clothes of one suffering from scabies to be unnecessary as a rule. It is sufficient if the clothes are thoroughly beaten and hung in the air for twenty-four hours. The matter is different when tramps are admitted into a hospital on account of scabies, then their clothes may be disinfected. Here there is the probability that in addition to scabies, there are other animal parasites, especially lice, which can be destroyed by disinfection. Compared with the conveyance of scabies from man to man, its conveyance from animal to man is rare. Occasionally however it is conveyed from the cat. This seems to be an exceptional event, and it can be as easily cured as the ordinary scabies.

In contrast with these, pediculi (capitis, pubis and vestimentorum) are ectoparasites. Their life conditions do not require that they should remain in the skin of man, but they are able, after having sucked the blood they need, to live upon the human skin. They can therefore be conveyed by intermediate hosts. Infection with head lice may occur through the use of a comb or the hairbrush of one who has

pediculi; infection with body lice through the wearing of the patient's clothes or by close contact with him. In these cases disinfection is naturally needed.

In conclusion, a few dermatoses must be mentioned, the exciting cause of which is not yet known, but which are clinically proved to be contagious. These are impetigo contagiosa and verrucae.

Impetigo contagiosa, as was first pointed out by Tilbury Fox in 1864, can be conveyed from children to adults or from adults to children. One therefore meets with it generally in several members of the family or at least in several children in a house. Recently we have often seen it follow primary vaccination or revaccination. In diagnosing so-called vaccination rashes, physicians should among other things bear in mind the possibility of impetigo contagiosa. Probably, in spite of all precautionary measures, infective agents are conveyed to man through the animal lymph from the calves used for the purpose. At least, in the calf lymph used for vaccinating, a coccus has been found which was proved by culture to be hitherto unknown. Only those lymphs should be used which we are convinced have been most carefully prepared. Children with impetigo contagiosa should be forbidden to go to school, and the part will heal quickly with white precipitate ointment.

Among the public there has always been a belief in the infectious nature of verruca vulgaris, but this opinion was not shared in scientific circles. No infective agent has yet been found, yet the experiments of Jadassohn and O. Lanz prove that it may be conveyed and will develop often after a very long incubation period varying from one and a half to six months. The best protection against auto-inoculation, which here comes in question, is early removal of the first wart by the sharp spoon or by caustics.

Similarly, foot and mouth disease in cattle may be conveyed to man, though here again we do not yet know what is the exciting agent. Yet the thorough investigations of Bussenius and Siegel undoubtedly prove that the infective material of foot and mouth disease may be conveyed to man

effect a lodgment there and cause disease. This is shown by experiment, by epidemics and by records of infection of individuals. Experience hitherto has shown that the predisposition of human beings to infection with this disease is but slight. Strict regulations should be adopted by the police authorities to prevent and forbid the sale of milk of diseased animals. Probably the infected germs in milk may in most cases be destroyed by mere boiling, and the disease is therefore rarely conveyed. The infection of an individual from a diseased animal can be prevented by the simplest precautions.

3. ENDEMIC DERMATOSES

Prophylaxis is equally successful against these. They occur endemically in some countries and districts. The aetiological factor is definitely known in some of these diseases and in others can be fairly surmised, and the spread of the disease and its extension to other countries can therefore be prevented. For this purpose an international law relating to epidemics is needed.

In comparison with other diseases most can be done by prophylaxis for leprosy. This is some slight consolation, because we are powerless to do anything when the disease has once fully developed, and we do not yet know any means of influencing its course. We know that the infection of leprosy takes place only from man to man. The danger of infection seems not to be great and the simplest rules of antisepsis often suffice to prevent infection. When, as in the case of nodular leprosy, open ulcers are present, in which the bacilli are freely exposed, it is natural that transmission from one individual to another may take place, more especially if they live in the same house. It becomes then a family disease in the truest sense of the word. In families where one member is being treated for leprosy, we can diagnose it early in any other member of the family from the presence of symptoms which under different conditions would not make it certain that leprosy was present.

Schäffer's recent interesting researches concerning the

spread of the bacilli of leprosy from the upper respiratory passages prove to us that this increases the danger of infection of leprosy. According to these researches, it seems that thousands of bacilli are scattered about in speaking, coughing and sneezing by a leprous patient whose mucous membranes are affected, though not necessarily severely. The dissemination of these bacilli cannot be prevented by therapeutic measures. Though these researches are not very reassuring, there is the fact that the conveyance of leprosy from one person to another takes place only when ordinary precautions are neglected; and though we know that experienced physicians, such as Danielssen, have never, in spite of years of experience in the Lungegaards Hospital at Bergen, seen a definite case of infection of leprosy in any of the attendants or doctors, yet the facts given above testify that isolation of the lepers is the only proper prophylaxis.

It must be confessed that this seems a little cruel. But looked at more closely, this measure is seen to be necessary and can be carried out humanely and for the benefit of the patient. They are not to be isolated in prisons but in hospitals, where the patient is surrounded by all modern hygienic methods. Moreover, most leprous patients come from the very poorest classes of society and would not be giving up anything if they were admitted free of charge. On the contrary, the family would be relieved of a heavy burden. In some countries, Brazil, Columbia and Uruguay, leprosy is so extensive an endemic disease that cases occur also among the better classes of society, and for these isolation would not be a benefit but a punishment. But in the interests of others, they too must conform to the regulations for isolation. Much may be done by humane methods to alleviate even their lot. Thus, one of my patients who became infected with leprosy in Montevideo and whose pecuniary circumstances are very good, has now received permission to live in a house of his own near Rostock.

All well-meant reasons which are urged against isolation are removed by the overwhelming fact of the statistics which we have from other countries.

Norway takes the lead. Here, in consequence of isolation

regulations, leprosy has steadily decreased from year to year, and one institution after another has been closed for want of patients. Indeed, Hansen has calculated that at the present rate of decrease there will probably be no more cases of leprosy in Norway by the year 1920. In view of this important fact, there can I think be no doubt about the justification of the isolation of leprous patients. The regulations must be humanely carried out. There should be frequent visiting times. In the less infectious form, anaesthetic leprosy, where there are no open sores to be an extra danger to those around, patients may even be permitted to visit their homes, if the healthy inmates there follow the ordinary rules of antisepsis. For it must be remembered that leprosy is infectious only when the patient is for a long time in close contact with those around him.

We are less favourably situated with regard to the prophylaxis of pellagra. It seems fairly certain that pellagra appears only in those countries (Moldavia, Wallachia, Friuli, Roumania and Italy) where the people are compelled by bad harvests to live chiefly upon maize, sometimes diseased maize. But it is not easy to find a remedy, because in those countries maize is used not only as a substitute for bread, but is also used in the preparation of spirits. The higher the prosperity of a country rises, the greater the demands of the people in living, and the more civilization advances, the rarer will pellagra become. It is the duty of the governments of countries affected with this disease, by all means at their disposal to prevent the results of bad harvests, to forbid the use of diseased maize and to substitute healthy grain for it.

Lastly, verruga peruana must be mentioned. This disease endemic in Peru seems dependent upon unfavourable telluric and climatic influences in valleys which run parallel with the coast, are free from winds, and in which severe fevers are constantly present. R. Ruge states, that in Peru the disease is generally attributed to the drinking of water, when the snow melts, out of the ravines of Agua de Verrugas, which is 40 miles from Lima and 6,000 feet above the

sea. Here the only prophylaxis can consist in drainage to divert the over-flowing rivers, and in providing more suitable conditions of life for the people of the country, and this can only be done at great expense.

4. THE PROPHYLAXIS OF DISEASES OF THE HAIR

has hitherto received far too little attention. I am certain, from my own experience, that one could do much by careful hygiene of the hair. Those cases where young people between twenty and thirty lose their hair and become bald would disappear entirely if proper attention were given to the hair when still healthy. Most people however do nothing at all in this respect.

The question is often put to us, whether frequent cutting of the hair has any good influence on its growth, and it must in my opinion be answered in the negative. If we consider the physiology of the growth of hair we have no ground for assuming that there is any such influence. A short time ago, Bischoff made some careful experimental investigations into this question in various animals, and the result showed that cutting the hair exercised no influence upon its growth.

It is quite another question whether by improving the general nutrition one can influence the growth of hair. I have no hesitation in replying in the affirmative. It is obvious that when the hair falls out considerably, the patient's general condition should be enquired into. Often I have seen excellent results when in addition to local treatment, attention was directed also to the anaemia, and the patient's diet was improved. In the treatment of skin diseases the physician is needed as well as the specialist. The proposals about food recently made by Deichler seem to me to be capable of influencing the growth of hair. For such patients, he places gelatinous foods in the foreground, and orders soups to be taken which have been made by boiling together two parts of meat and one of bone. Instead, one

may also use gruel; in short, it seems to me also that, in addition to local treatment of the scalp, gelatinous substances given for a long period will have good results.

Early treatment is very necessary for premature alopecia, which is one of the commonest diseases of the hair. Often patients come for treatment far too late, after there has already been considerable loss of hair. The dandruff which has been present for years is regarded as accidental, yet a complete cure can only be attained when this pityriasis or seborrhoea sicca has been treated. Nevertheless, in many families premature baldness seems to be hereditary. Here all our methods of treatment are often of no avail. But in the commoner cases, where the first symptom of disease is seborrhoea and the loss of hair is only a secondary factor, prophylaxis is important from the fact that the spread of seborrhoea from the head to the other parts of the body may be prevented. We can here do very much by prophylaxis. Unna was the first to point out that a form of eczema which he termed seborrhoeic eczema spreads from the head gradually over the whole body. Although according to my experience the frequency of this event is much exaggerated, yet it cannot be denied that this does occur in many cases. We do not yet know the aetiology of this seborrhoea, the organisms, morococci, which have been found are probably not pathogenic; nevertheless there is no doubt that clinically we have here a special morbid process. I do not agree with the view recently put forward by Török, who regards seborrhoeic eczema as a special form of psoriasis. It is well therefore to treat early any slight seborrhoea which may appear as a prophylactic measure against loss of hair.

Experience has also taught me that we can prevent trichorrhexis nodosa by prophylactic treatment. Contrary to the generally accepted opinion that this disease is of parasitic nature, I believe it is caused by dryness of the hair, and that the micro-organisms found are secondary. At least, I have obtained excellent results in trichorrhexis, both recent and of long duration, by the following treatment: The face and hair must not be washed with soap, and

a hair wash containing fat must be used. The following can be recommended :—

Castor oil, 5 ounces ;
Rectified spirit, ½ ounce ;
Oil of roses, 6 drops.

or

Glycerin, 25 parts ;
Lemon juice, 5 parts ;
Eau de Cologne to 100 parts.
(Unna).

From the prophylactic standpoint, I attach great importance to the ordering of hair-pomade or hair-oil. Even when the hair is still healthy and there is no evident loss of it, or when there is a loosening of the hair, I order the patient to use a simple pomade. I do not send the patient, as so often is done, to a drug shop or perfumery to buy a pomade whose composition I do not know, but consider that it is absolutely essential to order the ingredients which it is to contain. The simplest pomade is that recommended by Débay :

Lard, 60 parts ;
Oil of almonds, 4 parts ;
Balsam of Peru, 2 parts ;
Tincture of Benzoin, 1 part.

Some patients prefer an oil, and for these one may recommend almond oil with which has been mixed an alcoholic solution of tannin.

It is obvious that after using these fats the scalp must be cleansed, so that the fat may not undergo decomposition. Washing with water or soap is of no use for this purpose, but water and spirit should be used, which may also be added to the substances used to promote the growth of the hair. I often use the following hair-lotion :—

Tinct. cantharid., 10 parts ;
Spirit. lavand., 100 parts ;
Spirit. rosmar., to 200 parts.

But these alcoholic lotions can only be used often when the hair is naturally greasy. If the hair is always dry, it

needs fat. We should then rarely order an alcoholic mixture but would prescribe a hair-lotion, for example:—

℞. Chloral hydrat., 10 parts;
Glycerin, 20 parts;
Distilled water, 200 parts.

If such prophylactic treatment founded upon a rational basis is adopted for disease of the hair, and the general condition of the patient receives attention, good results are obtained. But even here, we have to remember that there are limits to our powers.

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